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MOBILE BA MODEL STUDY. REPORT 2. EFFECTS OF ENLARGED NAVIGATION--ETC(U)
MAR 79 R C BERGER, R A BOLAND

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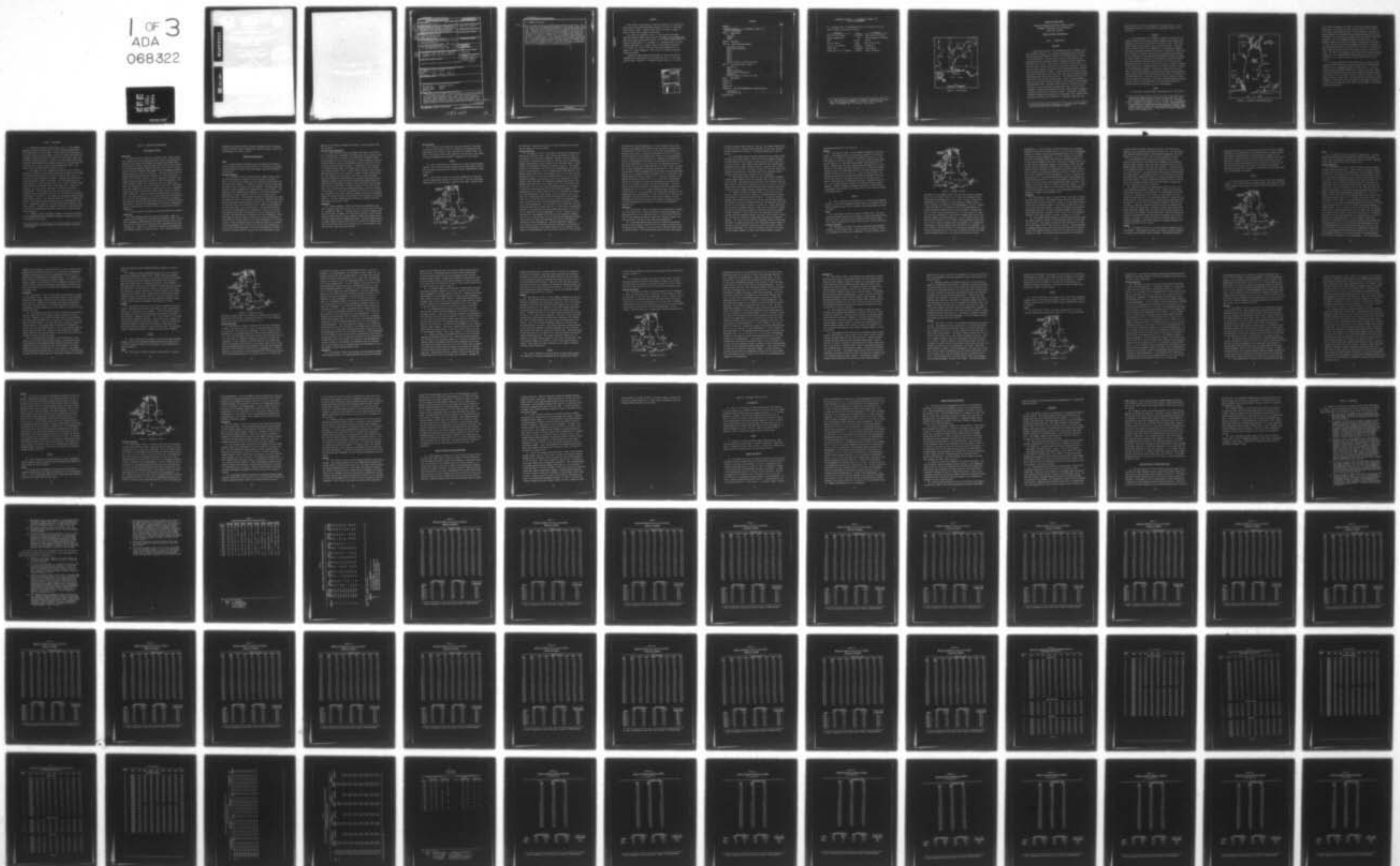

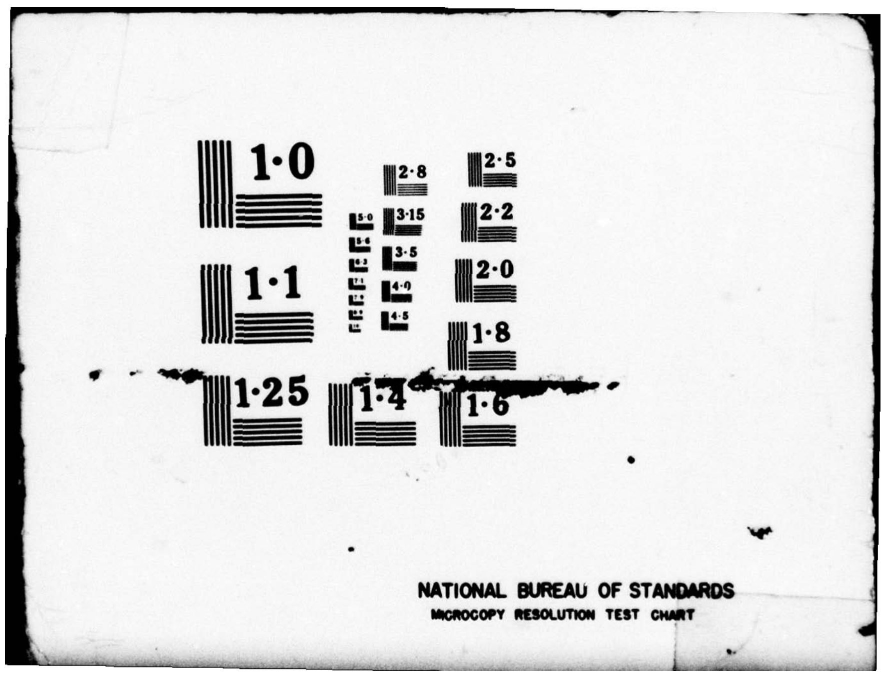
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report is the second in a series of reports on the results of model tests on the Mobile Bay model. Report 1 covers the verification and effects of proposed Theodore Ship Channel and Disposal Areas on tides, currents, salinities, and dye dispersion. Model tests in this report (Report 2) were chiefly designed to determine the impact of widening and deepening of the navigation channels and the accompanying dredged material disposal islands on CONT'

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tides, currents, salinities, and dye-dispersion patterns in Mobile Bay. The test results consist of comparable measurements of tide heights, current velocities, salinities, and dye-dispersion patterns for existing and proposed conditions. There was very little change in the tide heights in the bay for any plan. In general, for all plans an increase in maximum velocity occurred at stations in the low-velocity regions (the central region of the channel) and essentially, no change or a slight reduction in maximum velocity occurred at stations in the high-velocity regions (the upper and lower reaches). Enlargement of the channel seemed to be the dominant cause of salinity changes in the bay. All the plans generally raised the average salinity of the upper (north) bay and lowered the average salinity in the lower (south) bay. No plan maintained status quo (change at 0.5 ppt or less) in all four critical oyster-bed areas for area-average salinity or average bottom salinity.

# PREFACE

This report is the second in a series of reports on the results of model tests on the Mobile Bay model conducted for the U. S. Army Engineer District, Mobile. Each of these reports describes a complete phase of model tests conducted in the model.

The study was conducted at the U. S. Army Engineer Waterways Experiment Station (WES) during the period September 1975 to August 1976 under the general supervision of Messrs. H. B. Simmons, Chief of the Hydraulics Laboratory; F. A. Herrmann, Jr., Assistant Chief of the Hydraulics Laboratory; R. A. Sager, Chief of the Estuaries Division; R. A. Boland, Jr., Chief of the Interior Channel Branch; and R. C. Berger, Jr., Project Engineer. This report was prepared by Messrs. Berger and Boland.

Directors of WES during the performance of this study and the preparation and publication of this report were COL G. H. Hilt, CE, and COL John L. Cannon, CE. Technical Director was Mr. F. R. Brown.

CONTENTS

## CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

U. S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

| Multiply | By | To Obtain |
|---|---|---|
| cubic feet per second | 0.02831685 | cubic metres per second |
| degrees (Fahrenheit) | 5/9 | Celsius degrees or Kelvins* |
| feet | 0.3048 | metres |
| feet per second | 0.3048 | metres per second |
| miles (U. S. statute) | 1.609344 | kilometres |
| square feet | 0.09290304 | square metres |
| square miles (U. S. statute) | 2.589988 | square kilometres |

* To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use the following formula: $C = (5/9)(F - 32)$. To obtain Kelvin (K) readings, use: $K = (5/9)(F - 32) + 273.15$.

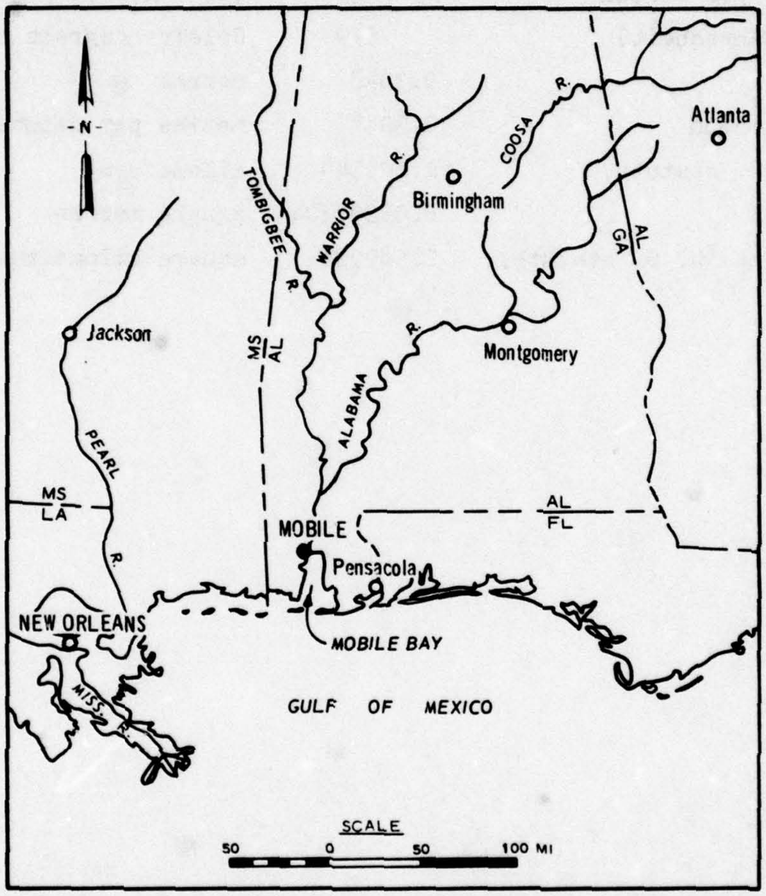


Figure 1. Vicinity map

MOBILE BAY MODEL STUDY

EFFECTS OF ENLARGED NAVIGATION CHANNEL ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION

MOBILE BAY, ALABAMA

Hydraulic Model Investigation

# PART I: INTRODUCTION

## Prototype

1. Mobile Bay, located in the southwestern part of Alabama on the Gulf of Mexico (Figure 1), is a roughly pear-shaped estuary 30 miles* long and varying in width from 8 miles at its northern end to 20 miles in its lower portion. The bay covers an area of approximately 392 square miles and is relatively shallow throughout with an average natural depth of 8 to 10 ft. The entrance to the bay from the Gulf of Mexico is about 3 miles wide and is 46 miles west of Pensacola, Florida, and 104 miles northeast of the mouth of the Mississippi River. The bay has two primary sources of water. Streams and rivers flowing into the bay provide fresh water, and tidal action provides saline water from the Mississippi Sound and the Gulf of Mexico. The greatest influx of fresh water enters the bay from the Mobile River, which is formed approximately 40 miles north of Mobile, Alabama, by the junction of the Alabama and Tombigbee Rivers. The Mobile River flows in a southerly direction for some 45 river miles before entering Mobile Bay. The river has a watershed of almost 43,650 square miles that includes most of Alabama, northeast Mississippi, and northwest Georgia. Other major tributaries include the Tensaw River, Spanish River, Apalachee River, Blakely River, Dog River, Fowl River, and Fish River. The Spanish, Apalachee, and

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* A table of factors for converting U. S. customary units of measurement to metric (SI) units is presented on page 3.

Blakely Rivers are straits originating in the Tensaw River.* A more detailed description of the prototype is presented in Report 1** of this series.

## Purpose

2. The enlargement of the navigation channels to Mobile and the Theodore Industrial Park would provide a savings because larger, more economical ships could be used and full loading of ships, rather than partial loading (light-loaded ships), would be effected. With additional terminal facilities and completion of the Tennessee-Tombigbee Waterway, substantial transportation benefits are expected. Model tests were conducted to determine the impact of the widening and deepening of the channels and the accompanying dredged material disposal islands on tides, currents, salinities, and dye-dispersion patterns in Mobile Bay, with particular interest centered around the oyster-bed areas generally located in the lower portions of the bay, as shown in Figure 2. It was feared that the large disposal area islands, required to contain the initial material dredged to construct the channels plus several years of maintenance dredging, would adversely affect existing circulation patterns in Mobile Bay, particularly with respect to salinities in the oyster-bed areas. The model tests were chiefly designed to determine the effects on hydraulics, salinities, and dye-dispersion patterns, and the results include measurements of water-surface elevations, current velocities, salinities, and dye concentrations.

## Scope

3. The present existing channel widths/depths are: 600 ft/42 ft

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* The mean freshwater inflow to the bay is about 63,000 cfs, with a normal annual range from about 15,000 to 115,000 cfs. The neap, mean, and spring tidal ranges are 1.0, 1.3, and 2.5 ft, respectively.

** R. J. Lawing, R. A. Boland, Jr., and W. H. Bobb, "Mobile Bay Model Study; Effects of Proposed Theodore Ship Channel and Disposal Areas on Tides, Currents, Salinities, and Dye Dispersion," Technical Report H-75-13, Report 1, Sep 75, U. S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.

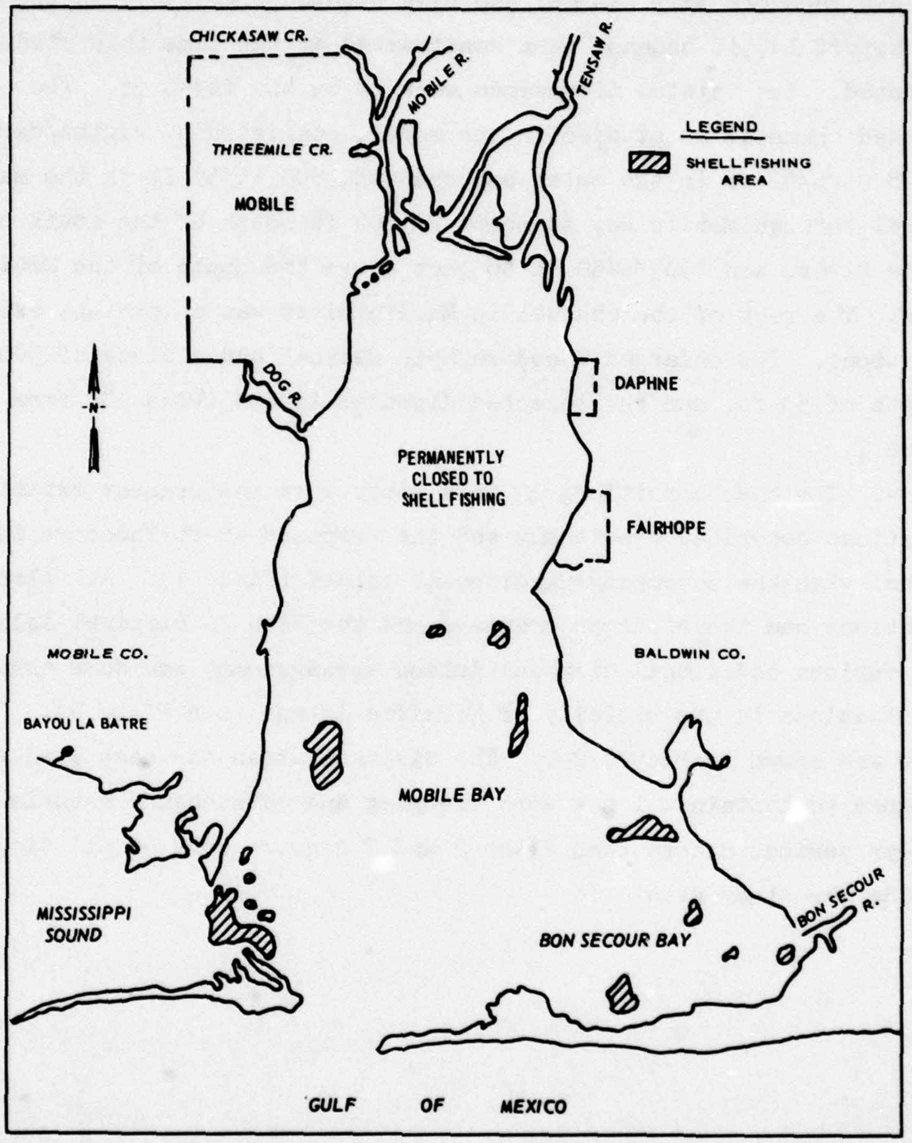


Figure 2. Location of shellfishing areas

in the outer bar channel, 400 ft/40 ft in the main channel through Mobile Bay to the mouth of the Mobile River, and 500 to 775 ft/40 ft in the river to the highway bridge 4.5 miles upstream. Although the proposed Theodore Ship Channel had been studied previously in the model (see Report 1), it had not been constructed at the time this study was conducted. Its initial dimensions were to be 400 ft/40 ft. The deepened channel, as studied in the model, consisted of widths/depths of: 800 ft/52 ft in the outer bar channel, 500 ft/50 ft in the main channel through Mobile Bay to about 20,000 ft south of the mouth of the Mobile River, and 700 ft/50 ft to just above the mouth of the Mobile River. The rest of the channel in Mobile River was at present existing conditions. The enlarged Theodore Ship Channel had a width of 500 ft, a depth of 50 ft, and the selected disposal island (Plan 1D) from Report 1.

4. The base conditions in this study were the present existing conditions described previously and the proposed 40-ft Theodore Ship Channel with the accompanying disposal island (Plate 1). All plan conditions had the enlarged channels and the Plan 1D disposal island with various additional disposal island arrangements and some channel modifications in the vicinity of McDuffie Island (see Plate 9). These plans are shown in Plates 2-9. The disposal areas for each plan were designed to contain all new work dredging and maintenance material for a 50-yr period, except that Plans 2 and 7 require some or all disposal outside the study area.

## PART II: THE MODEL

5. The Mobile Bay model, constructed at the U. S. Army Engineer Waterways Experiment Station (WES) in 1972, reproduced approximately 1073 square miles of the prototype, including about 268 square miles of the Gulf of Mexico from Pine Beach on the east to about the western end of Dauphin Island and offshore to about the -70 ft* contour (msl); all of Mobile and Bon Secour Bays; a portion of the Mississippi Sound; and the Mobile and Tensaw Rivers and adjacent marshes to the junction of the two rivers at Mt. Vernon, some 40 miles upstream from Mobile. The limits of the area reproduced are shown in Plate 1.

6. The model was of the comprehensive fixed-bed type, molded in concrete to conform to 1972 prototype conditions, except for the navigation channel from deep water in the Gulf of Mexico, which was constructed to project dimensions or deeper. The model was constructed to linear scale ratios, model to prototype, of 1:1000 horizontally and 1:100 vertically. Other pertinent scale ratios, derived from the linear scale ratios by the Froudian laws of similitude, were: slope, 10:1; velocity, 1:10; time, 1:100; discharge, 1:1,000,000; and volume, 1:100,000,000. The salinity scale ratio for the study was 1:1. One prototype tidal cycle (diurnal tide) of 24 hr and 50 min was reproduced in the model in 14.904 min. The Alabama Grid Coordinate System was used for horizontal control. The model was about 370 ft at its longest and 180 ft at its widest points, covering an area of approximately 30,000 sq ft. Topographical features of the prototype were reproduced to the +10 ft contour. The model was completely enclosed in a shelter to protect it and its appurtenances from the weather and to permit uninterrupted operation.

7. Details of model adjustment, hydraulic and salinity verification, and appurtenances are presented in Report 1; therefore, they are not included in this report.

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* All elevations (el) cited herein are in feet referred to mean sea level (msl).

# PART III: MODEL TESTS AND RESULTS

## Description of Tests

### Base tests

8. Base tests were conducted to establish tides, current velocities, salinities, and dye concentrations as a basis for evaluating the results of later tests incorporating the proposed improvement plans. The base used to evaluate the improvement plans in this report consists of the existing navigation channel conditions (40 by 400 ft), the proposed 40- by 400-ft Theodore Ship Channel, and an accompanying disposal island referred to as Plan 1D in Report 1. The base tests and the subsequent plan tests were made for conditions of a Gulf spring tidal range of 2.3 ft (lower low water to higher high water) measured at the Dauphin Island Gulf gage and a duration of 24.84 hr (prototype). The total freshwater inflow at Mt. Vernon was 15,500 cfs (Mobile River, 9,021 cfs; Tensaw River, 6,479 cfs) for most of the tests. Additional tests were conducted for the Plan 2 conditions with a total freshwater inflow at Mt. Vernon of 63,500 cfs (Mobile River, 33,274 cfs; Tensaw River, 30,226 cfs). All dye tests were conducted using the latter inflow. The ocean salinity (i.e., the source salinity) was maintained at 30.0 ppt total salt throughout the tests, and the model was operated until salinity stability had been achieved prior to collecting any data. The results of the base test measurements are included in appropriate tables or plates along with similar results of plan tests for ease of comparison.

9. Test procedures are identical with those published in Report 1.

### Plan tests

10. Seven separate plans were tested in the model. Plans 1-6 consisted of the proposed 50- by 500-ft main navigation channel, 50- by 500-ft diagonally aligned Theodore Ship Channel with the Plan 1D disposal island, and the various disposal island configurations as shown in Plates 2-7. Plans 1, 2, 3, and 5 also included an anchorage area near McDuffie Island, as shown in Plate 9. Plan 7 (shown in Plate 8)

consisted of proposed navigation channel enlargement with no disposal islands, except the Plan 1D Theodore Ship Channel disposal island, and the anchorage area shown in Plate 9.

## Model Data Measurements

### Tides

11. Tidal heights for base and plan conditions were measured at hourly intervals at seven locations (Plate 1). The data were obtained over two consecutive tidal cycles, and average values were determined for each hour.

### Current velocities

12. Locations of the 10 stations used to measure current velocities along the main ship channel at hourly intervals are shown in Plate 1. The data were obtained over two consecutive tidal cycles and the results were averaged. In addition to plots of velocity throughout the tidal cycle, the velocity data are tabulated. The tabulations also present the time and magnitude of maximum ebb and flood currents. The data were used to determine the percentage of total flow downstream, a measurement of relative amount of ebb flow at the station over a 24.82-hr tidal cycle. The computation was made by determining the total area under the ebb and flood velocity curves over a complete tidal cycle at each measurement point, dividing this value into the area under the ebb velocity curve, and multiplying by 100 to obtain the percentage of the total flow that is in the ebb direction. The ebb and flood flows at the point of measurement are in balance for a value of 50 percent. Percentages greater than 50 indicate more flow in a downstream or ebb direction than upstream and are referred to as "ebb predominant," while percentages of flow less than 50 indicate more flow in an upstream or flood direction and are referred to as "flood predominant." In addition to plots of flow predominance profiles along the length of the channel, the flow predominances are listed in the velocity data tabulation as "Percent Total Flow Downstream." For ease in evaluating the effects of each plan on maximum current velocities and flow predominance, rough

measures of the degree of change with respect to base conditions have been tabulated.

Surface current photographs

13. Hourly surface current photographs were taken of the Plans 7 and 2 configurations to determine the effects the Plan 2 disposal island had on surface current patterns for the 63,500-cfs freshwater inflow. The photographs are 4-sec time exposures of confetti squares floating on the water surface, and the streak lengths show the total travel of the confetti during the exposure interval. By flashing a light just prior to closing the camera lens, dots appear near the ends of the streaks to indicate direction of flow. Surface current velocities can be determined by measuring the total lengths of confetti streaks and comparing the total lengths with the velocity scale shown in each photograph. Velocities obtained by this method are true surface velocities and will generally be greater than the surface velocity measurements made with current meters at comparable stations, since the surface velocity measured with the current meters is made at a depth of 3 ft below the surface. Only the reduced-in-size photographic mosaics from the strength of flood (hours 4, 5, and 6) and strength of ebb (hours 16, 17, and 18) are presented in this report; however, complete sets of full-size photographs (25 mosaics for each test condition) were furnished to the Mobile District. If a more detailed current analysis is required, the full-size mosaics are on file at WES.

Salanities

14. Salinity samples, surface and bottom, were obtained hourly over a complete tidal cycle at sta 1-14, S-4, S-7, S-10, S-12, S-14, and M-1 through M-27 (Plate 1). Salinity data are plotted as minimum, maximum, and average (throughout the tidal cycle) profiles on three lateral transects across the bay; and the maximum, minimum, and average salinities are tabulated for all sampling stations. The three transects were: (a) upper transect, with sta M-2, M-6, M-7, and M-8; (b) central transect, with sta M-9, M-10, M-11, and M-12; and (c) lower transect, with sta M-15, M-4, M-16, M-17, M-5, and M-18.

Dye dispersion

15. A series of dye dispersion tests was conducted in the model to determine the effects of Plan 2 on dispersion of conservative dye injected at sta R-1 (Plate 1) near the mouth of the Mobile River. Because of the large volume of data produced by the dye tests, the results of the dye experiments are presented in Appendix A of this report.

## Plan 1

16. Plan 1 consisted of the proposed 50- by 500-ft main navigation channel, 50- by 500-ft diagonally aligned Theodore Ship Channel with the Plan 1D disposal island, and the disposal island configuration as shown in Figure 3.

Tides

17. The effects of Plan 1 are shown by comparisons of base and plan test measurements presented in Plates 10-12. The only significant changes noted are the decrease in range at State Docks, resulting from

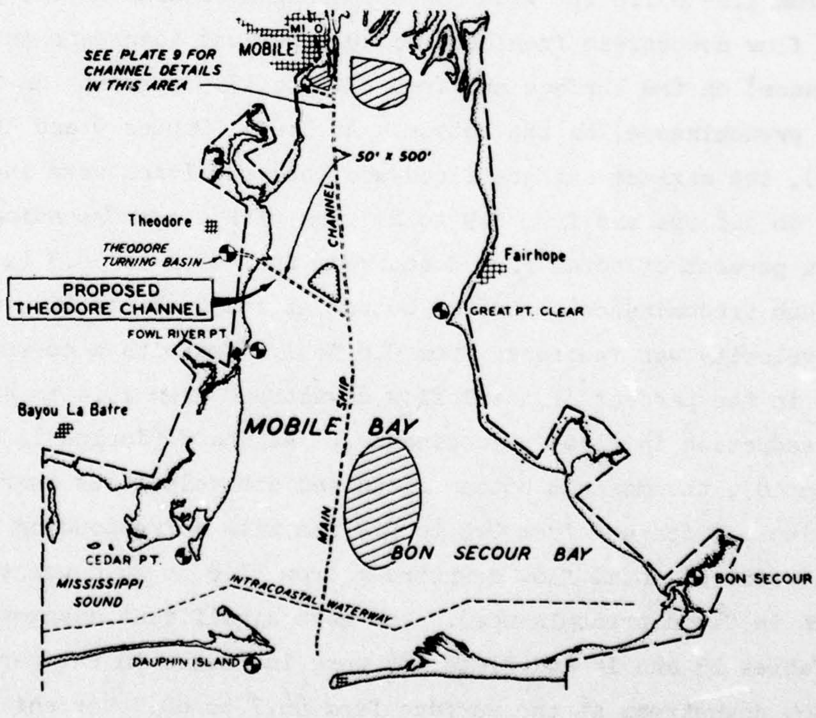


Figure 3. Elements of Plan 1

the lowering of high water by about 0.2 ft and a lowering of the tidal plane by about 0.2 ft at Fowl River.

Current velocities

18. The effects of Plan 1 on current velocities are illustrated in Tables 1-22 and Plates 13-22. Plate 23 shows the effects of Plan 1 on the percent of the total flow downstream. Tables 1 and 2 are particularly useful in determining the degree of velocity and flow predominance changes, respectively, at each station and for each plan tested. Longitudinal flow predominance profiles are shown in Plate 23. The effects of Plan 1 on the percent of the total flow downstream are illustrated in Tables 1-22 and Plate 24. At sta 2 (Tables 5 and 6 and Plate 14), the maximum surface ebb velocity was decreased from 2.0 to 1.3 fps, and the maximum bottom flood velocity was decreased from 1.9 to 1.4 fps, with no significant changes to the percent of total flow downstream. At sta 3 (Tables 7 and 8 and Plate 15), significant increases were noted in the maximum flood velocities on the surface from 1.2 to 1.9 fps and on the bottom from 1.0 to 1.6 fps with corresponding decreases in the percent of total flow downstream from 60.2 to 49.7 percent (decrease in ebb predominance) on the surface and from 27.3 to 17.9 percent (an increase in flood predominance) on the bottom. At sta 4 (Tables 9 and 10 and Plate 16), the maximum surface flood and ebb velocities were increased from 0.8 to 1.8 fps and from 0.9 to 2.5 fps with a corresponding decrease in percent of total flow downstream from 62.1 to 58.3 (a reduction in ebb predominance). On the bottom at sta 4 (Table 10), the maximum ebb velocity was increased from 0.8 to 1.4 fps with a corresponding increase in the percent of total flow downstream from 19.4 to 43.7 percent (a reduction in flood predominance). At sta 5 (Tables 11 and 12 and Plate 18), the maximum bottom flood and ebb velocities increased from 0.6 to 1.2 fps and from 0.3 to 0.9 fps with corresponding increase in the percent of total flow downstream from 21.8 to 36.8 percent (a reduction in flood predominance). The most significant changes at sta 6 (Tables 13 and 14 and Plate 18) were increases in the percent of total flow downstream at the surface from 66.7 to 80.7 percent (an increase in ebb predominance) and at the bottom from 11.6 to 43.5 percent

(a reduction in flood predominance). At sta 7 (Tables 15 and 16 and Plate 19), the maximum flood velocities on the surface and bottom were increased from 0.9 to 1.6 and 0.9 to 1.7 fps with corresponding decreases in the percent of total flow downstream from 31.6 to 15.3 percent and from 29.4 to 21.8 percent (an increase in flood predominance). At sta 8 (Tables 17 and 18 and Plate 20), significant increases were noted in the maximum flood velocities on the surface from 0.3 to 0.8 fps and on the bottom from 1.4 to 2.1 fps with corresponding decreases in the percent of total flow downstream from 91.5 to 82.4 percent (a reduction in ebb predominance) on the surface and from 26.5 to 15.4 percent (an increase in flood predominance) on the bottom. The only significant changes at sta 9 (Tables 19 and 20 and Plate 21) were a decrease in the surface maximum ebb velocity from 2.1 to 1.5 fps and a decrease in the maximum bottom flood velocity from 1.4 to 0.8 fps with corresponding increase in the percent of total flow downstream on the bottom from 39.6 to 51.7 percent (a reduction in flood predominance). At sta 10 (Tables 21 and 22 and Plate 22), the maximum surface ebb velocity was increased from 2.3 to 2.7 fps, and the maximum bottom flood was increased from 0.7 to 1.1 fps; however, the corresponding changes in flow predominance were insignificant. As seen in Plate 23, the direction of predominant flow was not reversed at any station; however, the ebb predominance at the surface of sta 3 was changed to balanced flow and the flood predominance at the bottom of sta 9 also was changed to balanced flow.

Salinities

19. The effects of Plan 1 on salinities are illustrated in Tables 23-25 and Plates 24-29. Tables 23-25 list the maximum, average, and minimum salinities for the base and Plans 1-7, while Plates 24-29 are plots of the salinity observations along three transects (upper, central, and lower) selected for more detailed consideration.

20. The minimum surface salinities were increased considerably along all three transects (Plate 24) with the largest increases being 6.7 ppt at sta M-7 (upper), 4.7 ppt at sta M-10 (central), and 5.2 ppt at sta M-16 (lower). The minimum bottom salinities were significantly

increased along the upper transect (Plate 25), the largest change being 4.6 ppt at sta M-6. Minimum bottom salinities on the lower transects, however, generally were reduced. The maximum change was 3.5 ppt at sta M-5.

21. The average surface salinities generally were increased along the upper and central transects (Plate 26) with the largest increases occurring along the upper transect, varying from 3.0 ppt at sta M-8 to 5.0 ppt at sta M-2. The average bottom salinities were significantly increased along the upper transect (Plate 27), varying from 2.0 ppt at sta M-8 to 5.0 ppt at M-6. Decreases of about 2.0 ppt were noted in the average bottom salinities on the east side of the navigation channel along the central and lower transects at sta M-5 and M-11.

22. The maximum surface salinities were significantly increased along the upper transect (Plate 28), varying from 2.0 ppt at sta M-8 to 6.0 at sta M-6. The maximum bottom salinities were increased along the upper transect (Plate 29), varying from 2.0 ppt at sta M-7 to 6.0 ppt at sta M-6, while the maximum bottom salinities were decreased along the central and lower transects (greatest change was 3.8 ppt at sta M-11).

23. Salinity results for samples from all 46 stations are presented in Tables 23-25 and were examined to determine whether any general patterns of change were caused by Plan 1. In general, maximum, average, and minimum salinities at the surface were decreased along the main channel in the bay, throughout lower bay (including Bon Secour Bay), and east of the navigation channel in central bay. Surface salinities were increased throughout upper bay (except for the navigation channel) and west of the navigation channel in central bay (except for maximum surface salinities). Bottom salinities were decreased in lower bay (except along the navigation channel) and east of the channel in central bay, but they were increased in upper bay (including the navigation channel). For each of these conditions (maximum, average, and minimum salinities at surface and bottom), there were about an equal number of stations at which salinities increased as there were those at which salinities decreased. The extent of saltwater intrusion in the channel was reduced somewhat, as seen by the reduced maximum, minimum,

and average salinities at sta 12 and 13.

Summary

24. The effects of Plan 1 on tide heights throughout the bay were minimal. The maximum velocities occurring at stations in low-velocity areas (sta 3-8) tended to be increased (usually by less than 1.0 fps), particularly in the flood direction. Sta 2 and 9 showed decreased maximum ebb velocities at the surface and maximum flood velocities at the bottom. Maximum velocities were significantly increased at sta 3 and 4, adjacent to the large oval-shaped disposal area. No significant change in percent total flow downstream occurred at the most seaward and most upstream stations (sta 1, 2, and 10). In the low flow portion of the channel, the percent of flow downstream tended to increase in the central portion (sta 4-6) but tended to decrease at both ends (sta 3, 7, and 8). The direction of predominant flow was not reversed at any station. The salinity intrusion length up the Mobile River was reduced somewhat. Minimum, average, and maximum salinities at surface and bottom generally were reduced in the lower portion of the bay and increased in the upper portion.

## Plan 2

25. Plan 2 consisted of the proposed 50- by 500-ft main navigation channel, 50- by 500-ft diagonally aligned Theodore Ship Channel with the Plan 1D disposal island, and the disposal island configuration as shown in Figure 4.

Tides

26. The effects of Plan 2 are shown in Plates 10-12. The only significant changes noted are the decrease in range at Great Point Clear and State Docks, resulting from the lowering of high water by about 0.2 ft, and a lowering of the tidal plane of about 0.2 ft at Fowl River.

Current velocities

27. The effects of Plan 2 on current velocities are illustrated in Tables 1-22 and Plates 13-22. Plate 23 shows the effects of Plan 2 on the percent of the total flow downstream. At sta 2 (Tables 5 and 6

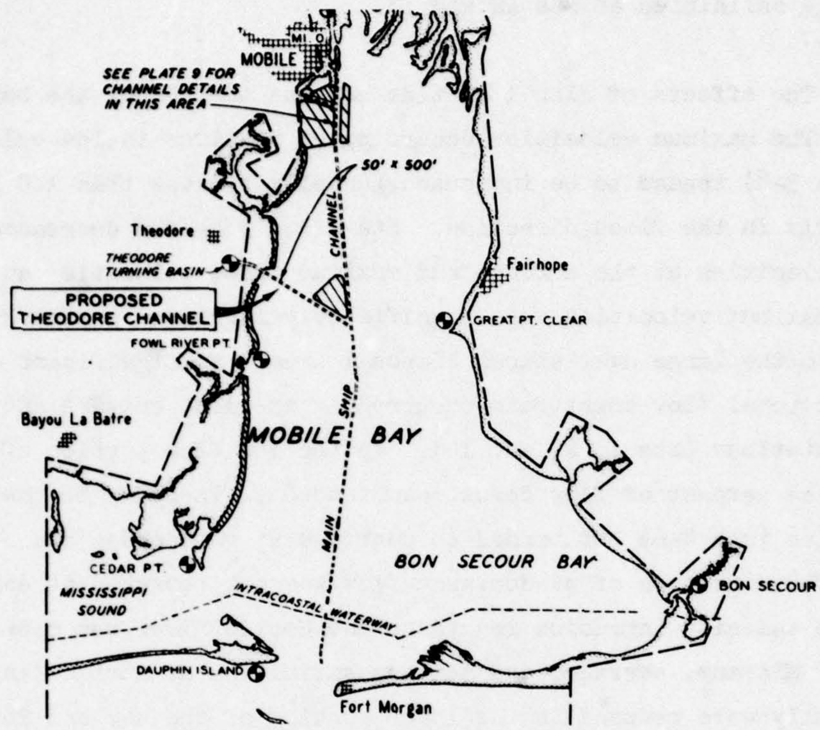


Figure 4. Elements of Plan 2

and Plate 14), the maximum surface flood and ebb velocities decreased from 2.3 to 1.9 fps and from 2.0 to 1.1 fps, and the maximum bottom flood velocity decreased from 1.9 to 1.3 fps. Percent of total flow downstream at sta 2 (Table 5) on the surface was changed from 40.1 to 31.1 percent (an increase in flood predominance). At sta 3 (Tables 7 and 8 and Plate 15), the percent of total flow downstream at the surface and bottom changed from 60.2 to 46.3 percent (a change from ebb to a slight flood predominance) and 27.3 to 38.3 percent (a reduction in flood predominance), respectively, although there were no significant changes in maximum velocities. At sta 4 (Tables 9 and 10 and Plate 16), the percent of total surface flow downstream decreased from 62.1 to 43.8 percent (a change from ebb predominance to a slight flood predominance), although maximum surface velocities were unchanged. At sta 5 (Tables 11 and 12 and Plate 17), although the maximum bottom flood velocity increased from 0.6 to 1.2 fps, the percent of total flow downstream increased from 21.8 to 31.2 percent (a reduction in flood

predominance). At sta 6 (Tables 13 and 14 and Plate 18), the maximum bottom ebb velocity was increased from 0.3 to 1.0 fps with corresponding increase in percent of total flow downstream from 11.6 to 35.4 percent (a reduction in flood predominance). At sta 7 (Tables 15 and 16 and Plate 19), the maximum surface ebb velocity was increased from 0.6 to 1.1 fps, and the maximum bottom flood velocity was increased from 0.9 to 1.6 fps, with no significant changes to the percent of total flow downstream. The only significant changes at sta 8 (Tables 17 and 18 and Plate 20) were an increase in the maximum bottom flood velocity from 1.4 to 2.0 fps and a corresponding reduction in percent of total flow from 26.5 to 18.7 (increase in flood predominance). At sta 9 (Tables 19 and 20 and Plate 21), a significant decrease was noted in the maximum surface ebb velocity from 2.1 to 1.3 fps and maximum bottom flood velocity from 1.4 to 0.7 fps, but no other significant changes were noted. Sta 10 (Tables 21 and 22 and Plate 22) showed no significant changes. As seen in Plate 23, the only changes in the direction of flow predominance occurred on the surface at sta 3 and 4, where ebb-predominant flow was changed to slightly flood-predominant flow.

Salinities

28. The effects of Plan 2 on salinities are illustrated in Tables 23-25 and Plates 24-29. The minimum surface salinities were increased along all three transects (Plate 24), except at the easternmost stations of the lower and central transects. The largest increase was 8.4 ppt at sta M-4 on the lower transect. Changes in minimum bottom salinities were random (Plate 25). The most significant change in the minimum bottom salinities was a decrease of 4.0-4.5 ppt at the two easternmost stations on the lower transect (sta M-18, 4.0 ppt; M-5, 4.5 ppt).

29. The average surface salinities were increased along the upper and central transects, except at the easternmost station on each transect (Plate 26). The largest increases on each transect were 3.0 ppt at sta M-6 (upper) and 2.1 ppt at sta M-9 (central). Slight reductions in average salinities were noted along the lower transect on the east side of the navigation channel at sta M-17 (1.0 ppt), M-5 (2.5 ppt), and M-18 (1.0 ppt). The average bottom salinities were increased on

the upper transect (largest increase of 3.0 ppt at sta M-6) and decreased on the central and lower transects (Plate 27). The most significant decreases were noted east of the navigation channel on the lower transect at sta M-17 (2.5 ppt), M-5 (4.0 ppt), and M-18 (3.5 ppt).

30. The maximum surface salinity was increased about 3.5 ppt (Plate 28) at sta M-6 but was essentially unchanged at other stations along the upper transect, while there was a noticeable decrease in the maximum surface salinities along the lower transect. On the east side of the navigation channel, the reduction varied from 2.5 ppt at sta M-18 to 5.0 ppt at sta M-5. The maximum bottom salinity was increased along the upper transect by a maximum of about 4.0 ppt (Plate 29) at sta M-6; while there was a significant decrease in salinities along the central and lower transects. The most significant decrease occurred on the east side of the navigation channel along the lower transect varying from 2.7 ppt at sta M-17 to 5.0 ppt at sta M-5.

31. Maximum, average, and minimum salinity data for all 46 stations sampled are presented in Tables 23-25. Surface salinities generally were decreased in the bay portion of the navigation channel and in lower bay (including Bon Secour Bay); but they generally were increased in upper bay, west of the navigation channel in central bay, and at the entrance to Mississippi Sound. Bottom salinities generally were decreased on the east side of the navigation channel in lower and central bay. In addition, maximum bottom salinities were decreased west of the channel in central bay. Increases in bottom salinity were prevalent in the main channel from just inside the bay to just upstream of Mobile and at the entrance to Mississippi Sound. Salinity (surface and bottom) was decreased at about one-third more stations than it was increased. The extent of salinity intrusion in the main channel was essentially unchanged, as seen from inspection of maximum, average, and minimum salinities at sta 12 and 13.

## Summary

32. The effects of Plan 2 on the tide heights throughout the bay were minimal. The maximum velocities in the upper and lower reaches of the channel were generally reduced slightly. The maximum velocities

occurring at locations in the low velocity areas (sta 3-8) were slightly increased at the bottom depth in the flood direction. Overall, significant changes in percent total flow downstream were minimal, but the direction of predominant flow on the surface was reversed at sta 3 and 4. There was no change in salinity intrusion length up the Mobile River. Salinities generally were reduced east of the channel in lower and central bay and on the surface along the bay portions of the channel. Salinities generally were increased in the entrance to Mississippi Sound and on the bottom of the channel.

## Plan 3

33. Plan 3 consisted of the proposed 50- by 500-ft main navigation channel, 50- by 500-ft diagonally aligned Theodore Ship Channel with the Plan 1D disposal island, and the disposal island configurations as shown in Figure 5.

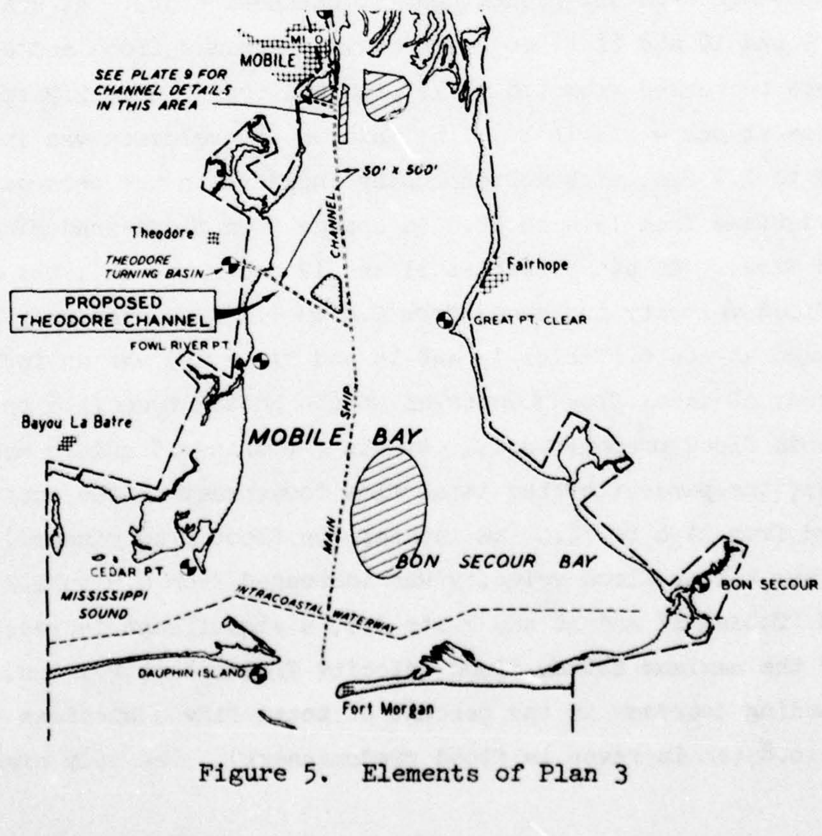


Figure 5. Elements of Plan 3

## Tides

34. The effects of Plan 3 are shown in Plates 10-12. The only significant change noted is the decrease in range at State Docks, resulting from the lowering of high water by about 0.2 ft and a lowering of the tidal plane at Fowl River by about 0.2 ft.

## Current velocities

35. The effects of Plan 3 on current velocities are illustrated in Tables 1-22 and Plates 13-22. Plate 23 shows the effects of Plan 3 on the percent of the total flow downstream. At sta 2 (Tables 5 and 6 and Plate 14), the maximum surface ebb velocity was decreased from 2.0 to 1.3 fps, and the maximum bottom flood velocity was decreased from 1.9 to 1.3 fps, with no significant changes in the percent of total flow downstream. At sta 3 (Tables 7 and 8 and Plate 15), significant increases were noted in the maximum flood and ebb velocities on the surface from 1.2 to 1.8 fps and from 1.8 to 2.3 fps, and there was a decrease in the percent of total surface flow downstream from 60.2 to 49.2 percent (change from ebb-predominant to balanced flow). At sta 4 (Tables 9 and 10 and Plate 16), the maximum surface flood and ebb velocities were increased from 0.8 to 1.7 fps and from 0.9 to 2.2 fps. On the bottom at sta 4 (Table 10), the maximum ebb velocity was increased from 0.8 to 1.4 fps, with corresponding increase in the percent of total flow downstream from 19.4 to 50.2 (a change from flood-predominant to balanced flow). At sta 5 (Tables 11 and 12 and Plate 17), the maximum bottom flood velocity increased from 0.6 to 1.2 fps. The only significant change at sta 6 (Tables 13 and 14 and Plate 18) was an increase in the percent of total flow downstream at the bottom from 11.6 to 21.6 (a decrease in flood predominance). At sta 7 (Tables 15 and 16 and Plate 19), the percent of the total flow downstream on the surface was decreased from 31.6 to 18.5 (an increase in flood predominance), and the maximum bottom flood velocity was increased from 0.9 to 1.7 fps. At sta 8 (Tables 17 and 18 and Plate 20), a significant increase was noted in the maximum bottom flood velocity from 1.4 to 2.1 fps, with corresponding decrease in the percent of total flow downstream from 26.5 to 16.8 (an increase in flood predominance). The only significant

changes at sta 9 (Tables 19 and 20 and Plate 21) were a decrease in the maximum bottom flood velocity from 1.4 to 0.8 fps and a corresponding increase in the percent of total flow downstream from 39.6 to 49.2 (a change from flood predominance to balanced flow). Sta 10 (Tables 21 and 22 and Plate 22) showed no significant changes. As seen in Plate 23, the only changes in the direction of flow predominance occurred on the surface of sta 3, where ebb predominance was changed to balanced flow, and on the bottom at sta 4 and 9, where flood predominance was changed to balanced flow.

Salinities

36. The effects of Plan 3 on salinities are illustrated in Tables 23-25 and Plates 24-29. The minimum surface salinities were increased along all three transects (Plate 24) with the largest change being 5.6 ppt at sta M-16. Changes in the minimum bottom salinities generally were small and random (Plate 25), although significant decreases occurred along the lower transect east of the channel at sta M-5 (4.5 ppt) and M-18 (4.0 ppt).

37. The average surface salinities were increased along the upper transect (Plate 26) with the largest increase occurring at sta M-6 (2.5 ppt). Changes on the central and lower transects were generally small and random, although there was reduction in salinities of 1.5 ppt along the lower transect on the east side of the navigation channel at sta M-5 and M-18. The average bottom salinities were increased at sta M-6 (2.0 ppt) and decreased about 2.0 ppt at all stations along the central transect (Plate 27). Along the lower transect, the average bottom salinities were decreased about 3.0 ppt on the east side of the navigation channel (sta M-5 and M-18).

38. The maximum surface salinity was increased about 3.5 ppt (Plate 28) at sta M-6 along the upper transect, while there were general reductions in the maximum surface salinities along the central transect (3.0 ppt at sta M-9) and east of the channel on the lower transect (2.0 ppt at sta M-18 and 3.0 ppt at sta M-5). The maximum bottom salinity was increased about 4.0 ppt (Plate 29) at sta M-6 along the upper transect, while there was a significant decrease in salinities

along the central and lower transects (greatest change of 4.0 ppt at sta M-9).

39. Maximum, average, and minimum salinities at all 46 stations sampled are presented in Tables 23-25. Surface salinities generally were reduced in the main channel in the bay and in lower bay (including Bon Secour Bay) east of the channel, whereas they were increased in upper bay (except at M-1, the uppermost station), in the entrance to Mississippi Sound, and west of the channel in central bay (only for minimum salinities). Bottom salinities generally were decreased in lower and central bay, but were increased in the main channel in the extreme upper bay and the Mobile area. Surface and bottom salinities were decreased at about twice as many stations as they were increased. The extent of salinity intrusion in the main channel was slightly reduced as seen by the reduction in maximum bottom salinity at sta 13.

Summary

40. The effects of Plan 3 on tide heights throughout the bay were minimal. Some maximum velocities were decreased in the high-velocity region of the lower reach of the channel. In the low-velocity region of the channel (sta 3-8), the bottom maximum flood velocities generally were increased. Maximum velocities of sta 3 and 4 adjacent to the large oval disposal island were increased. Other than at sta 4, changes in percent of total flow downstream were minimal. Surface salinities generally were reduced in lower bay and increased in upper bay, while bottom salinities were reduced in lower and central bay. The upstream extent of saltwater intrusion in Mobile River was reduced slightly.

## Plan 4

41. Plan 4 consisted of the proposed 50- by 500-ft main navigation channel, 50- by 500-ft diagonally aligned Theodore Ship Channel with the Plan 1D disposal island, and the disposal island configuration as shown in Figure 6.

Tides

42. The effects of Plan 4 are shown in Plates 30-32. The only

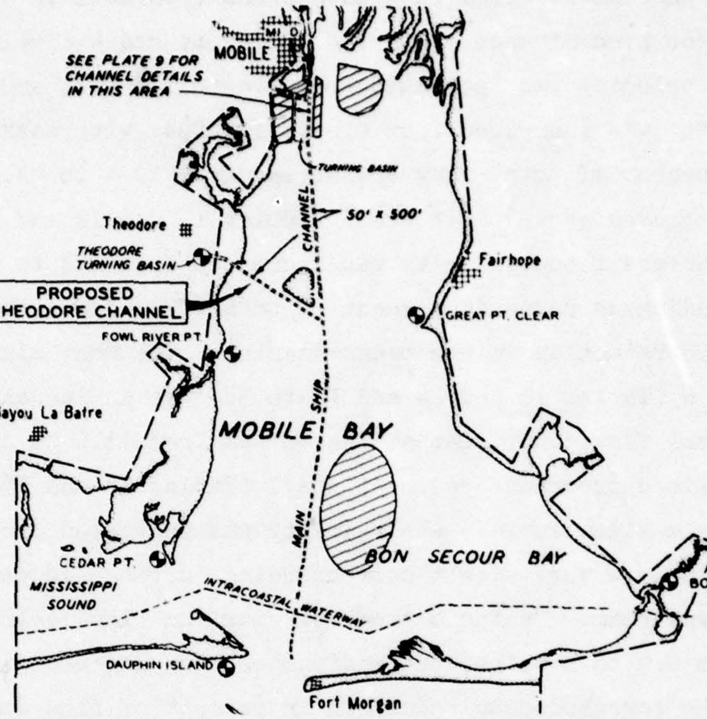


Figure 6. Elements of Plan 4

significant changes noted are the decrease in range at State Docks, resulting from the lowering of high water by about 0.3 ft and a lowering of the tidal plane at Fowl River by about 0.2 ft.

Current velocities

43. The effects of Plan 4 on current velocities are illustrated in Tables 1-22 and Plates 33-42. Plate 43 shows the effects of Plan 4 on the percent of the total flow downstream. At sta 2 (Tables 5 and 6 and Plate 34), the maximum surface ebb velocity was decreased from 2.0 to 1.0 fps, and the maximum bottom flood velocity was decreased from 1.9 to 1.4 fps, with no significant changes to the percent of total flow downstream. At sta 3 (Tables 7 and 8 and Plate 35), an increase was noted in the maximum flood velocity on the surface from 1.2 to 1.8 fps, with corresponding decrease in the percent of the total flow downstream from 60.2 to 49.8 percent (a reduction in ebb predominance). At sta 4 (Tables 9 and 10 and Plate 36), the maximum surface flood and ebb velocities were increased from 0.8 to 2.0 fps and from 0.9 to 1.8 fps, with

a decrease in percent of total flow downstream from 62.1 to 54.3 (a reduction in ebb predominance). On the bottom at sta 4 (Table 10), the maximum flood velocity was increased from 1.4 to 1.8 fps, and the maximum ebb velocity was increased from 0.8 to 1.4 fps, with corresponding increase in percent of total flow downstream from 19.4 to 44.9 (a reduction in flood predominance). At sta 5 (Tables 11 and 12 and Plate 37), the maximum surface flood velocity was increased from 0.8 to 1.1 fps, with corresponding decrease in percent of total flow downstream from 61.0 to 51.8 (a reduction in ebb predominance). The most significant change at sta 6 (Tables 13 and 14 and Plate 38) was an increase in the percent of total flow downstream at the bottom from 11.6 to 29.9 (a reduction in flood predominance). At sta 7 (Tables 15 and 16 and Plate 39), the maximum surface ebb velocity was increased from 0.6 to 1.3 fps, with only a very slight corresponding increase in percent of total flow downstream. On the bottom, the maximum flood velocity was increased from 0.9 to 1.6 fps, the maximum ebb was decreased from 0.8 to 0.4, and the corresponding reduction in percent of flow downstream was from 29.4 to 11.2 (an increase in flood predominance). At sta 8 (Tables 17 and 18 and Plate 40), an increase was noted in the maximum bottom flood velocity from 1.4 to 1.9 fps, with corresponding decrease in percent of total flow downstream from 26.5 to 17.6 (an increase in flood predominance). The only significant changes at sta 9 (Tables 19 and 20 and Plate 41) were a decrease in the maximum bottom flood velocity from 1.4 to 0.6 fps, with corresponding increase in percent of total flow downstream from 39.6 to 59.9 (change from flood to ebb predominance). At sta 10 (Tables 21 and 22 and Plate 42), maximum bottom ebb velocity was decreased from 0.8 to 0.4 fps, and the percent of flow downstream decreased from 46.6 to 37.3 percent (an increase in flood predominance). As seen in Plate 43, the direction of predominant flow was reversed only on the bottom at sta 9, although surface ebb predominance at sta 3 was changed to almost exactly balanced flow.

## Salinities

44. The effects of Plan 4 on salinities are illustrated in Tables 23-25 and Plates 44-49. The minimum surface salinities were increased

along all three transects (Plate 44) with the largest change being 6.0 ppt at sta M-6. The minimum bottom salinities were increased about 2.5 ppt at sta M-6 (Plate 45) but were unchanged at other stations along the upper transect. Minimum bottom salinity decreases were noted at the two middle stations on the central transect (1.5 ppt at sta M-11 to 3.0 ppt at sta M-10) and along the entire lower transect varying from 0.9 ppt at sta M-4 to 2.6 ppt at sta M-5.

45. The average surface salinities were increased along the upper and central transects (maximum of 5.0 ppt at sta M-6), but were essentially unchanged on the lower transect (Plate 46). Average bottom salinities (Plate 47) were increased at M-6 (3.0 ppt) but were unchanged at other stations along the upper transect. Average bottom salinities were decreased about 2-3 ppt on the central transect (except there was essentially no change at the easternmost station) and east of the channel on the lower transect (1.5 ppt at sta M-5 and 2.0 ppt at sta M-18).

46. The maximum surface salinity was increased about 4.0 ppt (Plate 48) at sta M-6 but was unchanged at the two outer stations on the upper transect. There was a noticeable decrease in the maximum surface salinities along the central transect (2.0 ppt at sta M-10) and on the east side of the navigation channel along the lower transect (2.0 ppt at sta M-5 and M-18). The maximum bottom salinity was increased about 4.0 ppt (Plate 49) at sta M-6 but was unchanged at other stations along the upper transect. There was a significant decrease in salinities along the central transect (3.4 ppt at sta M-10) and on the east of the navigation channel on the lower transect (1.7 ppt at sta M-18).

47. Maximum, average, and minimum salinities at all 46 stations sampled are presented in Tables 23-25. Surface salinities generally were decreased in the navigation channel up to about the Theodore Ship Channel (except that maximum salinities were unchanged) and in lower bay (except that minimum salinities west of the channel were increased). In central bay, maximum surface salinities were reduced, but minimum surface salinities were increased. Surface salinities were increased in upper bay. Bottom salinities were reduced in lower bay (except that minimum salinities west of the channel were increased). Maximum and

average bottom salinities in central bay were reduced, but minimum salinities were increased. Upper bay bottom salinities were increased. The number of stations that showed reduced salinities was about equal to those showing increases for maximum and average salinity at the surface and maximum bottom salinity. There were more than twice as many reductions as there were decreases for average and minimum salinity, but the reverse was true for minimum surface salinity. The extent of saltwater intrusion was reduced slightly, as seen by the maximum, average, and minimum salinities at sta 12 and 13.

Summary

48. The effects of Plan 4 on tide heights throughout the bay were minimal. The maximum velocities occurring during a tidal cycle generally were increased in the low-velocity region (sta 3-8) of the channel. Increases in the flood direction were more prevalent than in the ebb. Maximum velocities at sta 4 adjacent to the large disposal island were increased in both flood and ebb directions at the surface and at the bottom. Maximum velocities for the higher velocity regions of the channel (sta 1, 2, 9, and 10) were decreased. The percent total flow downstream was not significantly altered at most locations in the channel. Sta 3 and 4 showed reductions in percent total flow downstream at the surface. Sta 4 and 9 showed substantial increases in percent total flow downstream at the bottom. The minimum salinities occurring during a tidal cycle were generally increased throughout the bay on the surface, except that they were reduced in Bon Secour Bay. The bottom depth minimum salinities were increased in the upper and central bay and were reduced in Bon Secour Bay. The average salinities tended to be increased in the upper bay and reduced in the central and lower bay. Maximum salinity changes were similar to those of the average salinity changes. There was only a small reduction in the length of salinity intrusion up the Mobile River.

## Plan 5

49. Plan 5 consisted of the proposed 50- by 500-ft main navigation channel, 50- by 500-ft diagonally aligned Theodore Ship Channel

with the Plan 1D disposal island, and the disposal island configuration as shown in Figure 7.

Tides

50. The effects of Plan 5 are shown in Plates 30-32. The only significant changes noted were the decrease in range at State Docks, resulting from the lowering of high water by about 0.3 ft and a lowering of the tidal plane by about 0.2 ft at Fowl River and State Docks.

Current velocities

51. The effects of Plan 5 on current velocities are illustrated in Tables 1-22 and Plates 33-42. Plate 43 shows the effects of Plan 5 on the percent of the total flow downstream. At sta 2 (Tables 5 and 6 and Plate 34), the maximum surface ebb and flood velocities were decreased from 2.0 to 1.3 fps and from 2.3 to 1.9 fps, and the maximum bottom flood velocity was decreased from 1.9 to 1.3 fps, with no significant changes to the percent of total flow downstream. At sta 3 (Tables 7 and 8 and Plate 35), a significant increase was noted in the

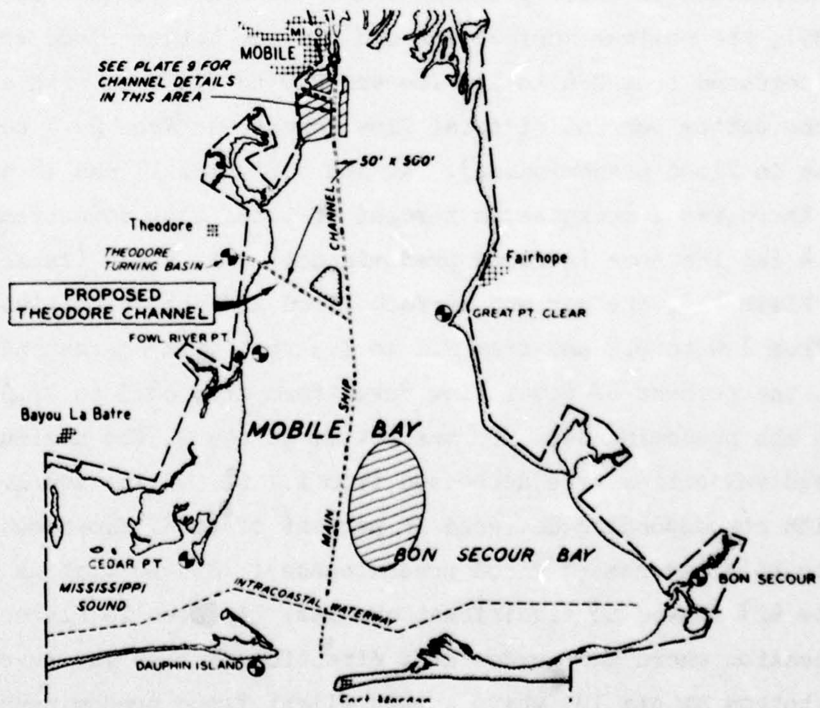


Figure 7. Elements of Plan 5

maximum flood velocity on the surface from 1.2 to 1.7 fps, with corresponding decrease in the percent of total flow downstream from 60.2 to 49.2 (change from ebb predominance to about balanced flow). On the bottom at sta 3, the maximum flood velocity was increased from 1.0 to 1.4 fps, with corresponding decrease in the percent of total flow downstream from 27.3 to 17.4 (an increase in flood predominance). At sta 4 (Tables 9 and 10 and Plate 36), the maximum surface flood and ebb velocities were increased from 0.8 to 1.6 fps and from 0.9 to 2.0 fps with essentially no change in percent of total flow downstream. On the bottom at sta 4 (Table 10), the maximum ebb velocity was increased from 0.8 to 1.3 fps, with corresponding increase in percent of total flow downstream from 19.4 to 45.7 (a reduction in flood predominance). The only significant change at sta 5 (Tables 11 and 12 and Plate 37) was an increase in the surface flood maximum from 0.6 to 1.1 fps. The only significant change at sta 6 (Tables 13 and 14 and Plate 38) was an increase in the percent of total flow downstream at the bottom from 11.6 to 27.9 (a reduction in flood predominance). At sta 7 (Tables 15 and 16 and Plate 39), the maximum surface ebb and maximum bottom flood velocities were increased from 0.6 to 1.1 fps and 0.9 to 1.6 fps, with a decrease in the bottom percent of total flow downstream from 29.4 to 16.4 (an increase in flood predominance). At sta 8 (Tables 17 and 18 and Plate 40), there was a decrease in percent of total flow downstream from 26.5 to 16.4 (an increase in flood predominance). At sta 9 (Tables 19 and 20 and Plate 41), the maximum surface flood and ebb velocities were decreased from 1.0 to 0.2 and from 2.1 to 1.3 fps, with corresponding increase in the percent of total flow downstream from 68.3 to 77.9 (an increase in ebb predominance). On the bottom at sta 9, the maximum flood and ebb velocities were decreased from 1.4 to 0.5 fps and 1.0 to 0.3 fps, with corresponding decrease in percent of total flow downstream from 39.6 to 26.3 (increased flood predominance). Sta 10 (Tables 21 and 22 and Plate 42) showed no significant changes. As seen in Plate 43, the only location where the predominant direction of flow was reversed was on the bottom at sta 10, where a very slight flood predominance was changed to ebb predominance.

## Salinities

52. The effects of Plan 5 on salinities are illustrated in Tables 23-25 and Plates 44-49. The minimum surface salinities were increased along all three transects (Plate 44), except at the easternmost station on the lower and central transects and the station just east of the channel on the upper transect. The largest increases of minimum surface salinities on each transect were 5.7 ppt at sta M-7 (upper), 5.7 ppt at sta M-10 (central), and 6.1 ppt at sta M-5 (lower). The minimum bottom salinities were increased about 2.5 ppt at sta M-6 but were essentially unchanged at other stations along the upper transect. Minimum bottom salinities along the central transect were decreased only at the two middle stations (2.0 ppt at sta M-12 and 3.0 ppt at sta M-10), and they were decreased along the lower transect varying from 0.2 ppt at sta M-16 to 3.2 ppt at sta M-18.

53. The average surface salinities along the upper and central transects were increased by maximums of 2.8 ppt at sta M-2 and 1.7 ppt at sta M-11 (Plate 46). Along the lower transect, the average surface salinities were essentially unchanged. The average bottom salinities were increased at sta M-6 (3.0 ppt) (Plate 47) but unchanged at other stations along the upper transect, but they were decreased along the central transect varying from 1.0 ppt at sta M-12 to a maximum of 3.0 ppt at sta M-10 and along the lower transect (maximum change of 2.6 ppt at sta M-15).

54. The maximum surface salinities were increased along the upper transect varying from 1.5 ppt at sta M-2 to 3.0 ppt at sta M-6, except there was no change near the east bank (Plate 48). Along the central transect, maximum salinities were decreased varying from 2.0 ppt at sta M-9 to 3.0 ppt at sta M-12, except there was a slight increase just east of the channel. Along the lower transect, the maximum salinities were decreased east of the navigation channel (0.8 ppt at sta M-18 and 1.8 ppt at sta M-13). The maximum bottom salinity (Plate 49) was significantly increased at sta M-6 (3.2 ppt), but there was no general pattern of change along the upper transect. A significant decrease in minimum bottom salinities was observed along the central transect

varying from 1.5 ppt at sta M-12 to a maximum of 3.0 ppt at sta M-9 and east of the channel on the lower transect (1.6 ppt at sta M-18 and 1.9 ppt at sta M-5).

55. Maximum, average, and minimum salinities at all 46 stations sampled are presented in Tables 23-25. Reductions in surface salinities were more scattered than for most other plans, but they occurred in the bay portion of the channel and in lower and central bay. Surface salinities were increased in upper bay, and random increases were scattered throughout the bay, particularly minimum values. Bottom salinities generally were decreased or unchanged in lower and central bay; while increases were limited to upper bay, the navigation channel from Theodore Ship Channel to Mobile, and the entrance to Mississippi Sound. The number of increases and decreases in salinities was about the same on the surface; however, there were many more decreases than increases of minimum and average salinities on the bottom and more increases of maximum bottom salinity than reductions. The extent of saltwater intrusion in Mobile River was essentially unchanged, as seen by maximum, average, and minimum salinities at sta 12 and 13.

Summary

56. The effects of Plan 5 on tide heights throughout the bay were minimal. The maximum velocities occurring in the low velocity regions (sta 3-8) showed scattered increases, mostly in the flood direction. Also, maximum velocities of sta 3 and 4 adjacent to the large oval disposal island were increased. The higher velocity regions (sta 1, 2, 9, and 10), particularly sta 9, were reduced in maximum velocities. There was no change in percent total flow downstream at the lower stations (sta 1 and 2). However, adjacent to the disposal island, sta 3 and 4 decreased in percent total flow downstream on the surface, and sta 4 increased in percent total flow downstream on the bottom. The bottom depth tended to increase in flood predominance in the upper part of the bay. The direction of predominant flow was reversed from flood to ebb at the bottom of sta 9 and was changed from ebb to balanced flow at sta 3. The minimum salinity occurring during a tidal cycle generally was increased throughout the bay on the surface. The bottom minimum

salinities were increased in the upper bay and reduced in the lower and central areas of the bay. The average salinities tended to be increased in the upper bay and decreased in the lower and central bay. The maximum salinities were increased in the upper bay and decreased or unchanged in central and lower bay. The salinity intrusion length up the Mobile River showed a minor decrease.

## Plan 6

57. Plan 6 consisted of the proposed 50- by 500-ft main navigation channel, 50- by 500-ft diagonally aligned Theodore Ship Channel with the Plan 1D disposal island, and the disposal island configuration as shown in Figure 8.

### Tides

58. The effects of Plan 6 are shown by comparison of base and plan test measurements presented in Plates 30-32. The only significant

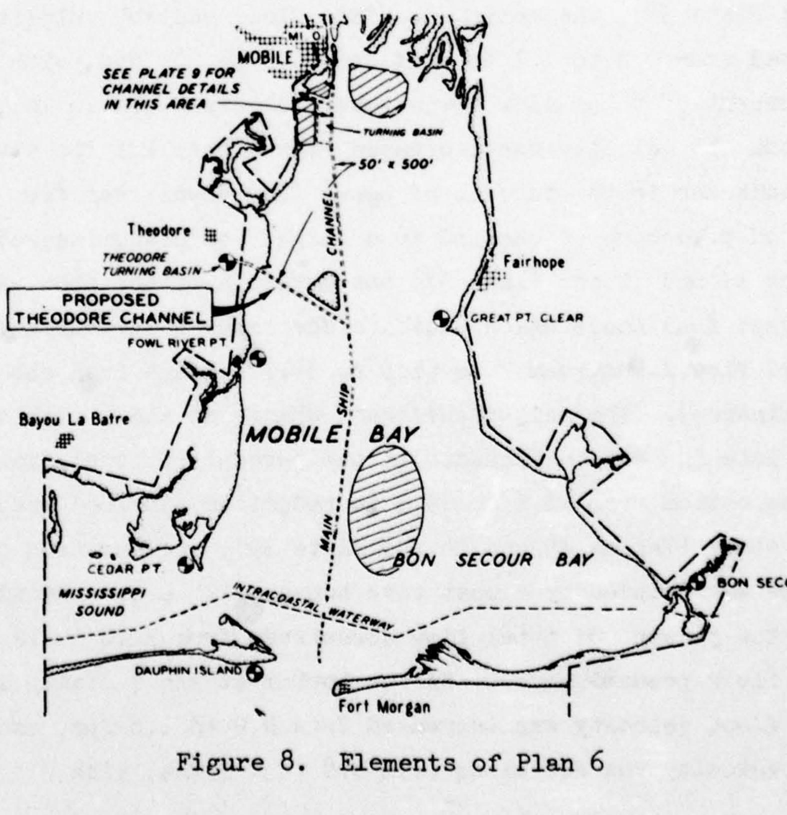


Figure 8. Elements of Plan 6

change noted is the decrease in range at State Docks resulting from the lowering of high water by about 0.2 ft and a lowering of the tidal plane by about 0.2 ft at Fowl River.

Current velocities

59. The effects of Plan 6 on current velocities are illustrated in Tables 1-22 and Plates 33-40. The effects of Plan 6 on the percent of the total flow downstream are illustrated in Plate 43. At sta 2 (Tables 5 and 6 and Plate 34), the maximum surface flood and ebb velocities were decreased from 2.3 to 1.9 and 2.0 to 1.3 fps, but flow predominance was unchanged. The maximum bottom flood velocity at sta 2 was decreased from 1.9 to 1.3 fps, but there was only a minor reduction in flood predominance. At sta 3 (Tables 7 and 8 and Plate 35), increases were noted in the maximum flood velocities on the surface from 1.2 to 1.6 and on the bottom from 1.0 to 1.4 fps, with corresponding decreases in the percent of total flow downstream from 60.2 to 46.9 (change from ebb to a slight flood predominance) on the surface. At sta 4 (Tables 9 and 10 and Plate 36), the maximum surface flood and ebb velocities were increased from 0.8 to 1.7 fps and from 0.9 to 2.0 fps, with no change in percent of total flow downstream. At sta 4 (Table 10), the maximum bottom ebb velocity was increased from 0.8 to 1.5 fps with corresponding increase in the percent of total flow downstream from 19.4 to 51.3 (flood predominance changed to a slight ebb predominance). At sta 5 (Tables 11 and 12 and Plate 37) the duration of ebb flow was reduced by almost four hours which caused a decrease in the surface percent of total flow downstream from 61.0 to 34.7 (change from ebb to flood predominance). The only significant change at sta 6 (Tables 13 and 14 and Plate 38) was an increase in the percent of total flow downstream at the bottom from 11.6 to 29.3 (a reduction in flood predominance). At sta 7 (Tables 15 and 16 and Plate 39), the duration of surface ebb flow was reduced by almost five hours, with a corresponding decrease in the percent of total flow downstream from 31.6 to 12.8 (an increase in flood predominance). On the bottom at sta 7 (Table 16), the maximum flood velocity was increased from 0.9 to 1.6 fps, and the maximum ebb velocity was decreased from 0.8 to 0.3 fps, with

corresponding decrease in the percent of total flow downstream from 29.4 to 12.8 (an increase in flood predominance). The only significant change at sta 8 (Tables 17 and 18 and Plate 40) was an increase in the maximum bottom flood velocity from 1.4 to 1.8. At sta 9 (Tables 19 and 20 and Plate 41), there was a decrease in maximum surface ebb velocity from 2.1 to 1.5 fps and a decrease in maximum bottom flood velocity from 1.4 to 0.9 fps, although the flow predominance was not changed at either depth. Sta 10 (Tables 21 and 22 and Plate 42) showed only slightly increased surface ebb velocity (2.3 to 2.7 fps). As seen in Plate 43, the direction of flow predominance was reversed from ebb to flood on the surface at sta 6 and was changed to essentially balanced flow on the surface at sta 3 and on the bottom at sta 4.

Salinity

60. The effects of Plan 6 on salinities are illustrated in Tables 23-25 and Plates 44-49. The minimum surface salinities were increased substantially along all three transects, except that there was essentially no change at the easternmost station on each transect (Plate 44). The largest increases on each transect were 4.7 ppt at sta M-7, 5.1 ppt at sta M-10, and 4.4 ppt at sta M-5. The minimum bottom salinities were increased about 2.0 ppt at sta M-8 (Plate 45) but were decreased slightly at other stations along the upper transect. Decreases in minimum bottom salinity were noted along the central transect varying from 1.0 ppt at sta M-9 to 3.0 ppt at sta M-10 (except there was no change at the easternmost station), and decreases were noted along the lower transect varying from 1.0 ppt at sta M-4 and M-16 to 3.5 ppt at sta M-5.

61. The average surface salinities were increased along the upper transect varying from 1.0 ppt at sta M-7 to 3.0 ppt at sta M-6 (Plate 46), but were essentially unchanged on the central and lower transects. Average bottom salinities (Plate 47) on the upper transect were essentially unchanged, except for a 3.0-ppt increase at sta M-8. Average bottom salinities were decreased along the central transect varying from 0.5 ppt at sta M-12 to a maximum of 3.8 ppt at sta M-10 and along the lower transect varying from 0.3 ppt at sta M-16 to 2.6 ppt at sta M-5.

62. The maximum surface salinities were increased along the upper

transect varying from 1.0 ppt at sta M-7 to 2.1 ppt at sta M-2 and M-8 (Plate 48). Along the central transect, the maximum surface salinities were decreased varying from 2.0 ppt at sta M-9 to 4.0 ppt at sta M-12, except that there was no change immediately east of the channel. Along the lower transect there were decreases in maximum salinities varying from 1.6-2.0 ppt at sta M-16, M-5, and M-18, whereas there were increases of 0.5 and 1.5 ppt at sta M-4 and M-16. The maximum bottom salinities along the upper transect were decreased 2.2 ppt at sta M-6 and increased 2.9 ppt at sta M-8 (Plate 49). Along the central transect, the maximum bottom salinities were decreased varying from 1.6 ppt at sta M-12 to a maximum of 3.9 ppt at sta M-10. Along the lower transect, the maximum bottom salinities were decreased 2.5, 1.7, and 1.2 ppt at sta M-15, M-5, and M-18 but increased slightly at sta M-16.

63. Maximum, average, and minimum salinities at all 46 stations sampled are presented in Tables 23-25. Minimum surface salinities were increased in upper bay and the west side of central and lower bay, while salinity decreases were limited to the eastern side of lower and central bay and the mouth of Mississippi Sound. Maximum and average surface salinities, on the other hand, were decreased throughout lower and central bay and in the bay portion of the navigation channel but increased in upper bay. At the mouth of Mississippi Sound, average surface salinities were decreased but maximum surface salinities were increased. There was considerably less variation among maximum, average, and minimum salinities. They were all decreased throughout lower and central bay, while increases were limited to a few stations in upper bay and in the navigation channel from Theodore Ship Channel to Mobile. At the mouth of Mississippi Sound, minimum bottom salinities were reduced, but maximum bottom salinities were increased. Decreased surface and bottom salinities (maximum, average, and minimum) occurred at about two to three times as many stations as showed increases (except that the number was the same for minimum surface salinities). The extent of saltwater intrusion was reduced somewhat for maximum and average salinities as seen at sta 13, but was essentially unchanged for minimum salinity conditions as seen at sta 12.

Summary

64. The effects of Plan 6 on tide heights throughout the bay were minimal. The maximum velocities in the high-velocity areas (sta 1, 2, 9, and 10) tended to be decreased slightly, particularly sta 2 and 9. The low-velocity region (sta 3-8) did not show much change in maximum velocity except close to the large disposal island (sta 3 and 4) where maximum velocities were increased. The upper and lower reaches of the channel did not change in percent total flow downstream. In the low-velocity region, the surface percent total flow downstream was generally reduced, particularly near the large disposal island (sta 3, 4, and 5); in fact, the predominant direction was reversed from ebb to flood at sta 3. On the bottom, however, there was no general pattern of predominance change nor any major changes, except that a strong flood predominance at sta 4 was changed to balanced flow. The minimum salinity occurring in a tidal cycle was generally increased at the surface throughout the bay, except Bon Secour Bay and the entrance to Mississippi Sound. The bottom minimum salinities were increased at some stations in upper bay, but decreased in the rest of the bay. The average and maximum salinities generally were increased at some stations in the upper bay and reduced in the central and lower bays. The salinity intrusion length up the Mobile River was not significantly altered for minimum salinity conditions, but was reduced slightly for maximum and minimum salinity conditions.

## Plan 7

65. Plan 7 consisted of proposed navigation channel enlargement with no disposal islands, except the Plan 1D Theodore Ship Channel disposal island, as shown in Figure 9.

Tides

66. As shown by the comparative base and plan tide curves included in Plates 50-52, tide range was reduced by 0.4 ft at Cedar Point and by 0.2 ft at Great Point Clear; also the tidal plane was lowered by about 0.2 ft at State Docks and Fowl River.

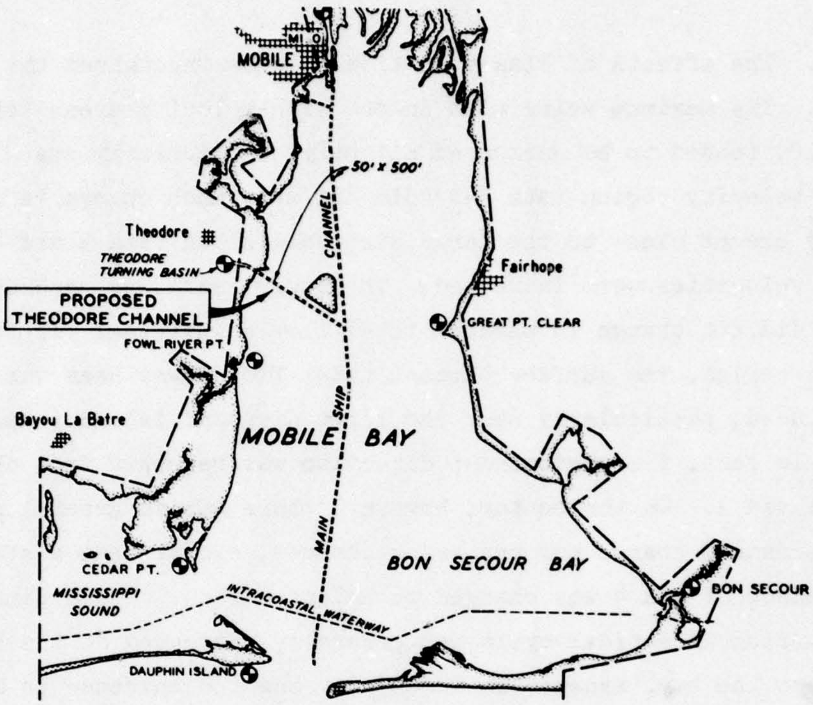


Figure 9. Elements of Plan 7

Current velocities

67. The effects of Plan 7 on current velocities are illustrated in Tables 1-22 and Plates 53-62. Plate 63 shows the effects of Plan 7 on the percent of the total flow downstream. At sta 2 (Tables 5 and 6 and Plate 54), the maximum bottom flood velocity was decreased from 1.9 to 1.4 fps. At sta 4 (Tables 9 and 10 and Plate 56), the maximum surface flood velocity was increased from 0.8 to 1.3 fps with a corresponding decrease in the percent of the total flow downstream from 62.1 to 56.3 (a reduction in ebb predominance). At sta 5 (Tables 11 and 12 and Plate 57), the maximum surface flood velocity was decreased from 0.8 to 0.5 fps, and the maximum ebb velocity was increased from 1.0 to 1.4 fps, with corresponding increase in the percent of the total flow downstream from 61.0 to 76.7 (an increase in ebb predominance). At sta 7 (Tables 15 and 16 and Plate 59), the maximum bottom ebb velocity was decreased from 0.8 to 0.3 fps, with corresponding decrease in the percent of the total flow downstream from 29.4 to 16.3 (an increase in

flood predominance). At sta 8 (Tables 17 and 18 and Plate 60), there was an increase in the maximum surface flood velocity from 0.3 to 1.0 and a decrease in the maximum ebb velocity from 2.4 to 1.5 fps, with corresponding decrease in the percent of the total flow downstream from 91.5 to 70.1 (a decrease in ebb predominance). At sta 9 (Tables 19 and 20 and Plate 61), the maximum surface flood and ebb velocities were decreased from 1.0 to 0.5 fps and 2.1 to 1.1 fps with no change in flow predominance. On the bottom at sta 9, the maximum flood velocity was decreased from 1.4 to 0.9 fps. Sta 10 (Tables 21 and 22 and Plate 62) showed no significant changes.

Salinities

68. The effects of Plan 7 on salinities are illustrated in Tables 23-25 and Plates 64-69. The minimum surface salinities were increased at most stations along all three transects (Plate 64), varying from 2.1 ppt at sta M-2 along the upper transect to a maximum of 6.4 ppt at sta M-10 along the central transect. There were no general patterns of changes to the minimum bottom salinities; the largest increase occurred at sta M-6 (3.0 ppt) along the upper transect (Plate 65), while the largest decrease was at sta M-5 (3.5 ppt) on the lower transect.

69. The average surface salinities were increased along the upper transect (Plate 66), varying from 2.3 ppt at sta M-8 to 3.0 ppt at sta M-6. The most significant change along the central transect was an increase in salinities of 3.4 ppt at sta M-11. The most significant changes along the lower transect were an increase of 3.4 ppt at sta M-15 and a decrease of 2.1 ppt at sta M-4. The average bottom salinities were increased along the upper transect, varying from 0.8 ppt at sta M-8 to 4.3 ppt at sta M-6 (Plate 67). The two westernmost stations on the central transect had decreases in average bottom salinities at sta M-9 (2.6 ppt) and sta M-10 (3.0 ppt). Along the lower transect, the salinities were decreased, varying from 0.5 ppt at sta M-17 to 2.8 ppt at sta M-5.

70. The maximum surface salinities were increased along the upper transect varying from 1.6 ppt at sta M-8 to 5.2 ppt at sta M-6 (Plate 68). Along the central transect, there was a decrease noted at sta M-9

(3.3 ppt) and M-10 (4.4 ppt), with an increase of 2.5 ppt at sta M-11. Along the lower transect, there was a significant decrease of 2.5 ppt at sta M-5, while the other stations generally had only slight decreases. The maximum bottom salinities were increased along the upper transect varying from 2.0 ppt at sta M-2 to a maximum of 4.4 ppt at sta M-6 (Plate 69). Along the central transect, the bottom salinities were decreased at sta M-9 (4.4 ppt) and M-10 (4.5 ppt), while along the lower transect the decrease varied from 0.8 ppt at sta M-4 to a maximum of 2.4 ppt at sta M-5.

71. Maximum, average, and minimum salinities for all 46 stations sampled are presented in Tables 23-25. In general, surface salinities were increased in upper bay and decreased in lower bay, although the trend in lower bay was weaker for minimum salinities than for the other conditions. In central bay, maximum surface salinities were reduced, but minimum surface salinities west of the channel were increased. Average surface salinities were reduced along the main channel in the bay, but the trend was weaker for minimum and maximum salinities. Bottom salinities were increased in upper bay (weaker trend than for surface salinities) and decreased in lower bay. In central bay, maximum and average salinities were reduced. In general, there were considerably more stations at which salinity was decreased than increased (but not double the number). The extent of saltwater intrusion in the channel was essentially unchanged, as seen from bottom salinities at sta 12 and 13.

Summary

72. The effects of Plan 7 on tide heights throughout the bay were minimal. The maximum velocities were not changed much throughout the channel length. Only one station (sta 9) in the higher velocity reaches had reduced maximum velocities. Other than a few isolated instances, the percent total flow was not severely altered throughout the channel. There were no instances in which the direction of predominant flow was reversed, and the most significant change was from 91.5 to 70.1 percent of total flow downstream at the surface of sta 8 (reduction in ebb predominance). Plan 7 was the only plan tested that did not generate a

change from ebb-predominant surface flow to flood-predominant or balanced flow at sta 3, which was located adjacent to the large lower bay disposal area in all plans except Plan 7. Similarly, Plans 2, 5, and 7 did not include the large disposal island east of the channel near McDuffie Island, and these were the only plans that did not change the bottom flood-predominant flow to ebb-predominant or balanced flow at sta 9, located at the upstream end of this large disposal island. Other changes in flow predominance were not always consistent for similar plans. This may have been caused by inaccuracies in measuring the very low velocities throughout most of the channel. The minimum salinities occurring during a tidal cycle were increased on the surface in upper and west central bay but reduced in lower bay. Bottom minimum salinities were increased in the upper bay and were reduced in lower bay. The average salinities on the surface were increased in the upper bay and reduced in lower bay. The bottom average salinities were increased in the upper bay and generally were decreased elsewhere in the bay. The maximum salinities were significantly increased in the upper bay, reduced in the central bay (particularly west of the main navigation channel), and reduced in the lower bay. The salinity intrusion length up the Mobile River was not significantly altered under these test conditions.

## Salinity Effects on Oyster-Bed Areas

73. Since changes in salinities in some localities within the bay are more significant than in others with regard to oyster production, four principal investigation areas were designated to facilitate analysis of the effects of the alternate plans on salinity patterns. In Plate 70 the limits of the four critical areas including the sampling stations are shown as follows: (a) area 1 (South of Channel) with sta M-9, M-10, and M-25; (b) area 2 (Whitehouse) with sta M-4, M-15, M-16, M-19, and M-20; (c) area 3 (Cedar Point) with sta S-4, S-7, S-10, S-12, and S-14; and (d) area 4 (Klondike) with sta M-11, M-12, M-13, M-14, and M-24. Salinity values in the four critical oyster areas are shown

in Tables 26 and 27. Table 27 shows the tidal-cycle average salinity values occurring in each area. Values are given for surface and bottom depths as well as the depth-averaged salinity values for base and all seven plans. The differences between these values for a particular plan and the corresponding base values also are shown. A value that shows no greater than 0.5-ppt difference relative to base is considered an insignificant change.

74. As far as oyster production is concerned, salinity changes occurring at the bottom depth are more important than surface or depth-averaged salinity changes. For the bottom depth, a noticeable decrease in average salinity relative to base occurs for all plans in areas 1 (South of Channel), 2 (Whitehouse), and 4 (Klondike). In area 1, the decrease varies from a minimum of 0.6 ppt for Plan 1 to as much as 3.3 ppt for Plan 6. The average salinity decrease in bottom salinity for area 2 was not quite as severe, varying from insignificant or no change for Plans 2, 3, and 7 to as much as 0.9 ppt for Plans 5 and 6. The average bottom salinity changes for each plan relative to base at area 3 were an increase in salinity of 0.7 ppt for Plans 2, 3, and 5 and a decrease of 0.8 ppt for Plan 6; all other plans resulted in only insignificant changes. Area 4 had variations in average bottom salinity reductions compared with base from as little as 0.8 ppt for Plan 7 to as much as 3.1 ppt for Plan 2.

75. Unlike the average bottom salinities in these critical areas, average surface salinity did not seem to follow any consistent pattern. Average surface salinities relative to base for area 1 were increased 1.7 ppt for Plans 1 and 2 and increased 0.7 ppt for Plan 5, whereas all other plans exhibited an insignificant difference. Area 2 had decreases in average surface salinity compared with base of 1.1 ppt for Plan 1, 0.9 ppt for Plan 7, 0.8 ppt for Plan 5, and 0.7 ppt for Plan 6; while all other plans showed insignificant changes. Average surface salinities in area 3 relative to base were increased 1.0 ppt by Plan 2 and 0.6 ppt by Plan 5, reduced relative to base 1.2 ppt by Plan 6 and 0.6 ppt by Plan 7, and essentially unchanged by Plans 1, 3, and 4. The only significant changes in average surface salinity in area 4 relative to base

were increases of 1.3 ppt for Plan 7, 0.9 ppt for Plan 3, and 0.6 ppt for Plan 1, whereas Plans 2, 4, 5, and 6 had no significant effect on average surface salinities in this area.

## PART IV: ADDITIONAL TESTS OF PLAN 2

### Introduction

76. Based on the analysis of test results presented in PART III, Plan 2 was selected by the Mobile District for further study with a mean freshwater inflow (63,500 cfs) and a spring tide range of 2.3 ft at the Dauphin Island gage. The tests were concerned with the effects of Plan 2 on tides, velocities, surface currents (as evidenced by surface current photography), salinities, and dye dispersion. Since the shoreline disposal areas along the western bank of the bay were in an extremely shallow area, these areas had little effect on the hydraulic or salinity regimen of the bay. For this reason, the Mobile District decided to omit the shoreline disposal areas for these tests.

### Tides

77. Plates 71-73 show the water-surface elevations for a tidal cycle of both Plan 2 and the base. Low-water elevation at Cedar Point was 0.4 ft higher for Plan 2 than for base. Also at this location, low water for Plan 2 preceded that of base by about two hours.

### Current Velocities

78. The effects of Plan 2 on current velocities for mean flow conditions are shown in Tables 28-48, and Plates 74-83, and the resulting effects of this plan on the percent of total flow downstream are illustrated in Tables 28-48, and Plate 84. Table 28 presents a summary of the velocity and flow-predominance changes, and Plate 84 is a plot of the longitudinal profiles of percent of flow downstream. The bottom maximum flood velocity at sta 1 decreased from 2.3 to 1.9 fps, and there was a corresponding slight increase in ebb predominance. At sta 2, surface maximum flood and ebb velocities decreased from 2.3 to 1.7 fps and from 2.2 to 1.7 fps without a significant change in percent

total flow downstream. Also at sta 2, the bottom maximum flood velocity was decreased from 1.6 to 1.2 fps, although the percent total flow downstream decreased from 33.6 to 19.8 (increased flood predominance). At sta 3, the surface maximum flood velocity was increased from 0.8 to 1.6 fps, the surface maximum ebb velocity was decreased from 1.9 to 1.5 fps, and the percent total flow downstream on the surface decreased from 67.8 to 46.7 (changed from ebb predominance to a slight flood predominance). The only significant change in bottom flow at sta 3 was a slight decrease in maximum flood velocity from 1.2 to 0.8 fps, and there was a corresponding slight decrease in flood predominance. The only significant change at sta 5 was an increase in surface maximum ebb velocity from 1.0 to 1.4 fps, and there was a corresponding slight increase in ebb predominance. At sta 6, the bottom maximum flood velocity was increased from 0.8 to 1.2 fps, the bottom maximum ebb velocity was reduced from 1.0 to 0.6 fps, and the percent total flow downstream was substantially reduced from 45.7 to 16.0 (increased flood predominance). The bottom maximum flood velocity at sta 7 was increased from 1.1 to 1.6 fps, and there was a corresponding slight increase in flood predominance. At sta 8, the surface maximum ebb velocity was increased from 3.0 to 3.7 fps, and there was a corresponding slight increase in ebb predominance. At the bottom of sta 8, maximum ebb velocity was decreased from 0.8 to 0.4 fps, and the percent total flow downstream on the bottom was decreased from 25.5 to 12.2 (increased flood predominance). At sta 9, the only significant changes were a reduction of the surface maximum ebb velocity from 2.2 to 1.8 fps and a decrease of bottom maximum flood velocity from 1.6 to 1.2 fps. At sta 10, the surface maximum ebb velocity was increased from 2.3 to 2.8 fps, the bottom maximum ebb velocity increased from 0.4 to 0.9 fps, and the percent total flow downstream on the bottom was reduced from 61.3 to 45.7 (changed from ebb predominance to a slight flood predominance). As can be seen in Plate 84, the only changes in the direction of predominant flow were at sta 3 (surface) and sta 10 (bottom) where flow predominance was reversed from ebb to flood and sta 3 (bottom) where flow was changed from balanced to flood predominant.

## Surface Current Photographs

79. The surface current photographs presented in this report are reductions of the original photographs for hours 4-6 and 16-18 (Photos 1-6). These photographs correspond approximately to strength of flood and strength of ebb. Each photograph presents a comparison of Plan 7 and Plan 2. Since Plan 7 contained no disposal islands other than the one associated with the Theodore Ship Channel, a comparison between Plan 7 and Plan 2 would show the effects of the Plan 2 disposal islands alone (both are 50-ft channel conditions).

80. Photos 1-3 represent strength of flood; however, at this freshwater inflow rate (63,500 cfs), the flow in the Mobile River continued to ebb in the confined flow region and for some distance downstream. Since Plan 2 confined the channel farther downstream by the disposal islands than did Plan 7, the flow continued to ebb farther downstream. The surface current photographs indicate that there would be no flood flows during the tidal cycle in the confined channel. The velocities in the navigation channel were increased by this confinement in Plan 2. Of course, in the bay area, flood flow was occurring for both plans. It is interesting to note that some flow was ebbing in the Mobile River, flowing through the pass between Pinto Island and the small island south of Pinto Island, and then flowing upstream into the marsh areas of Delvan and Polecat Bays. This flow through the pass seems to be somewhat stronger for Plan 2 than for Plan 7.

81. Photos 4-6 show the strength of ebb flow for both plans. The Plan 2 disposal islands increased the ebb velocities in the navigation channel, and the flow into the Mobile River from the east through the pass between Pinto Island and the small island to the south was substantially increased by Plan 2 as compared with Plan 7. South of the confinement imposed by the Plan 2 disposal island the currents that flow diagonally across the channel from the northeast to the southwest are stronger for Plan 2 than for Plan 7.

82. These current patterns and velocities occurred on the surface and may vary slightly from velocity measurements discussed previously,

which were taken by a meter measuring flow approximately 4 ft (prototype) below the surface.

## Salinities

83. The effects of Plan 2 on salinities are illustrated in Table 49 and Plates 85-90. The minimum surface salinities generally were increased along all three transects (Plate 85), except at the stations closest to the east bank. The change was greatest on the lower transect and decreased moving upstream. The largest changes on each transect were 4.7 ppt at sta M-4, 1.6 ppt at sta M-10, and 0.9 at sta M-2 (lower, central, and upper transects). Minimum bottom salinities were decreased sharply in the eastern three-fourths of the lower transect (Plate 86) and were increased in the western half of the central and upper transects. The largest changes on each range were -9.5 ppt at sta M-5, +2.3 ppt at sta M-10, and +1.6 ppt at sta M-2.

84. The average surface salinities were increased along the upper transect varying from 0.1 ppt at sta M-8 to a maximum of 0.9 ppt at sta M-6 (Plate 87). Along the central transect, the salinity was increased almost uniformly by about 1.0 ppt. On the lower transect, average surface salinities were reduced east of the channel (-4.8 ppt at sta M-18) but increased west of the channel (+2.8 ppt at sta M-4). Average bottom salinities (Plate 88) were increased west of the channel on the upper transect (+2.6 ppt at sta M-6) and central transect (+1.8 ppt at sta M-10) but were decreased on the eastern three-fourths of the lower transect (-7.6 ppt at sta M-5).

85. The maximum surface salinities along the upper transect were increased varying from 0.1 ppt at sta M-8 to 2.0 ppt at sta M-6 (Plate 89). Along the central transect, the maximum surface salinities were decreased by about 2-3 ppt, except at the easternmost station. On the lower transect, maximum surface salinities were reduced by about 6-8 ppt east of the channel, but increased by 1-2 ppt at the two westernmost stations. Maximum bottom salinities (Plate 90) on the upper transect were increased by 8.1 ppt at sta M-6 and by 2 ppt or less at the

other stations. On the central transect, maximum bottom salinities were reduced by about 2 ppt west of the channel. Maximum bottom salinities on the lower transect were sharply reduced (2.6-6.4 ppt) east of the channel.

86. Maximum, average, and minimum salinities for all 46 stations sampled are presented in Table 49. In general, surface salinities were reduced only in Bon Secour Bay and in the main navigation channel from the entrance to the Theodore Ship Channel, whereas increased surface salinities were prevalent throughout upper and central bay, west of the channel in lower bay, and in the mouth of Mississippi Sound. Reduced salinities were more extensive on the bottom, occurring throughout lower bay, east of the channel in central bay, and in the channel from the entrance to just upstream from Mobile; while increased salinities were limited to upper bay (except for minimum salinities) and west of the channel in central bay. For maximum salinities, there were slightly more decreases than increases at both surface and bottom. For average and minimum salinities, however, the trends were opposite at surface and bottom. There were half again as many reductions of surface average and minimum salinities as there were increases, but there were twice as many bottom reductions as there were increases. It is evident from the salinity values at sta 11 (Table 49) that the salinity intrusion length has been increased for Plan 2 under these test conditions. The bottom maximum salinity was 17.2 ppt at sta 11 for Plan 2, while base salinity was only 0.1 ppt.

## Salinity Effects on Oyster-Bed Areas

87. Salinity values in the four critical oyster-bed areas for Plan 2 and base at mean freshwater inflow conditions are shown in Table 50. (The limits of these critical areas are shown in Plate 70.) The surface and bottom average salinities over a tidal cycle for each station are presented. The average of each of these values for each critical area is shown as the area average surface and bottom salinities. These two salinities are then averaged to give one depth-averaged value of salinity

for each area. The differences between the area average salinities for Plan 2 and base are also shown in this table. A value for Plan 2 that shows no greater than 0.5-ppt difference relative to base is considered an insignificant change.

88. Salinity changes for bottom depth have a more direct effect on the oyster beds than the surface depth and will be discussed first. In area 1 (South of Channel) for the freshwater inflow of 63,500 cfs, average bottom salinities were increased 1.6 ppt for Plan 2 compared with base. (Low freshwater conditions for this area show an average bottom salinity decrease of 1.0 ppt attributable to this plan.) Area 2 (Whitehouse) had a decrease in average bottom salinity of 1.1 ppt. There was not a significant change at area 3 (Cedar Point). Area 4 average bottom salinity decreased 2.2 ppt by Plan 2. (Area 4 also had a substantial decrease in average bottom salinity due to Plan 2 for low freshwater inflow.)

89. Plan 2 increased average surface salinity for all critical areas: area 1 (South of Channel) increased 1.5 ppt, area 2 (Whitehouse) increased 2.1 ppt, area 3 (Cedar Point) increased 0.9 ppt, and area 4 (Klondike) increased 0.9 ppt.

## PART V: CONCLUSIONS

90. Based on the results of the physical model tests discussed in this report, conclusions concerning the channel enlargement and disposal island plans under low freshwater inflow (15,500 cfs) conditions were:

- a. There was very little change in the tide heights in the bay for any plan. However, the tide range at State Docks was reduced about 0.2 ft for all plans, as was the tidal plane at Fowl River.
- b. In general, for all plans an increase in maximum velocity occurred at stations in the low-velocity regions (the central region of the channel) and essentially, no change or a slight reduction in maximum velocity occurred at stations in the high-velocity regions (the upper and lower reaches). However, disposal islands near the channel did generate local effects on velocities at nearby channel stations. In particular, the large disposal island located in the lower bay for Plans 1, 3, 4, 5, and 6 seemed to increase maximum velocities at sta 3 and 4.
- c. The percent total flow downstream was not significantly changed at the two southernmost stations (sta 1 and 2) in the channel for any plan. These stations are about at the entrance of Mobile Bay to the Gulf of Mexico. Also the uppermost velocity station (sta 10) showed no significant change in percent total flow downstream for all plans except the bottom flow of Plan 5. This would indicate that there was no great change in the relative weight of flood to ebb flow at the lower boundary of the bay (entrance to the Gulf) or at the channel upstream boundary (the entrance of the Mobile River into the bay) to the channel enlargement or any of the disposal island arrangements tested at this flow condition.
- d. The effect on percent total flow downstream of the large oval-shaped disposal island located in the south part of Mobile Bay for Plans 1, 3, 4, 5, and 6 was to change surface ebb-predominant flow at sta 3 to flood-predominant or balanced flow. This change was consistent in all plans with the large island and was not present in Plans 2 and 7, which do not contain that island.
- e. The large disposal island located east of the channel near McDuffie Island for Plans 1, 3, 4, and 6 caused flood-predominant flow at the bottom of sta 9 (just upstream of the disposal island) to change to ebb-predominant or balanced flow. This change did not occur for the plans involving no disposal island or a smaller disposal island in this area.

f. Enlargement of the channel seemed to be the dominant cause of salinity changes in the bay. All the plans generally raised the average salinity of the upper (north) bay and lowered the average salinity in the lower (south) bay.

g. The salinity-intrusion length up the Mobile River was decreased slightly by Plans 2, 5, and 7 at low freshwater inflow conditions.

h. No plan maintained status quo (change of 0.5 ppt or less) in all four critical oyster-bed areas for area average salinity or average bottom salinity. The area average salinity for the bottom depth was significantly reduced (0.6-3.3 ppt) for South of Channel and Klondike critical areas in all plans. Surface and bottom area average salinities in the Whitehouse critical area were generally reduced. No large changes in surface or bottom area average salinities occurred at Cedar Point critical area.

91. Based on the results of the physical model tests discussed in this report, conclusions concerning the Plan 2 tests under mean freshwater inflow (63,500 cfs) conditions are:

a. There were only minimal changes in the tidal heights in the bay for this plan. Cedar Point showed the only significant differences.

b. In the low-velocity region of the channel (sta 3-8), maximum velocities generally were unchanged, although some random increases and decreases were noted. At sta 1, 2, and 9 in the high-velocity regions, maximum velocities were unchanged or decreased slightly; however, slight increases occurred at sta 10.

c. Generally, the percentage of total surface flow downstream was not significantly changed by this plan. However, the lower end of the channel was less ebb-predominant (significant reduction at sta 3) on the surface for Plan 2 than for the base. The percentage of total bottom flow downstream was decreased throughout most of the channel length (bottom flow had an increased flood predominance). The direction of predominant flow was changed from balanced to flood at the surface of sta 2, from ebb to balanced at the surface of sta 3, and from balanced to ebb at the bottom of sta 10.

d. The surface current photographs indicated that the disposal islands of Plan 2 relative to Plan 7 increased ebb velocities in the channel and also increased flow through the pass between Pinto Island and the small island just to the south. During strength of ebb, the cross-channel velocities south of the Plan 2 disposal island are increased relative to Plan 7 by Plan 2.

e. The average salinity in the bay increased for stations in the upper bay and west of the channel in central bay; although stations near the eastern shore in the upper bay were unchanged. Average salinity in the lower bay was significantly reduced east of the navigation channel, while station salinities west of the channel increased on the surface and decreased on the bottom. There seems to be an increased supply of salt water from the enlarged channel and a greater storage of fresh water in the Bon Secour Bay area. Changes in maximum or minimum salinities in some regions were quite different from those of the average salinity.

f. The salinity-intrusion length up the Mobile River was increased somewhat at the bottom depth for this fresh-water inflow.

g. The surface average salinity in the critical oyster-bed areas was increased by about 1-2 ppt in all four areas. Bottom average salinities were increased at the South of Channel area, reduced at the Whitehouse and Klondike areas, and essentially unchanged at the Cedar Point area.

Table 1

Changes to Maximum Current Velocities Caused by Plans 1-7

| Station | | Base, fps | | Plan 1 | | Plan 2 | | Plan 3 | | Plan 4 | | Plan 5 | | Plan 6 | | Plan 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sur | Bot | Sur | Bot | Sur | Bot | Sur | Bot | Sur | Bot | Sur | Bot | Sur | Bot | Sur | Bot |
| 1 | Flood | 3.7 | 3.1 | NC | NC | NC | - | NC | NC | - | NC | NC | NC | NC | NC | NC | NC |
| | Ebb | 2.9 | 2.4 | NC | NC | NC | NC | - | NC | NC | NC | - | NC | - | NC | NC | NC |
| 2 | Flood | 2.3 | 1.9 | NC | - | - | - | NC | - | - | - | - | - | - | - | NC | - |
| | Ebb | 2.0 | 0.9 | - | NC | - | NC | - | NC | - | NC | - | NC | - | NC | NC | NC |
| 3 | Flood | 1.2 | 1.0 | + | + | NC | NC | + | + | + | NC | + | + | + | + | NC | NC |
| | Ebb | 1.8 | 0.6 | NC | NC | NC | NC | + | NC | NC | NC | NC | NC | NC | NC | NC | + |
| 4 | Flood | 0.8 | 1.4 | + | NC | NC | NC | + | NC | ++ | + | + | NC | + | NC | + | NC |
| | Ebb | 0.9 | 0.8 | ++ | + | NC | NC | ++ | + | + | + | ++ | + | ++ | + | NC | NC |
| 5 | Flood | 0.8 | 0.6 | NC | + | NC | + | NC | + | NC | + | NC | + | NC | NC | NC | NC |
| | Ebb | 1.0 | 0.3 | + | + | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | + | NC |
| 6 | Flood | 0.6 | 0.8 | NC | NC | NC | NC | NC | NC | + | NC | NC | NC | NC | NC | NC | NC |
| | Ebb | 1.4 | 0.3 | NC | + | NC | + | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 7 | Flood | 0.9 | 0.9 | + | + | NC | + | NC | + | NC | + | NC | + | NC | + | NC | NC |
| | Ebb | 0.6 | 0.8 | NC | NC | + | NC | NC | NC | + | - | + | NC | NC | - | NC | - |
| 8 | Flood | 0.3 | 1.4 | + | + | NC | + | NC | + | NC | + | NC | NC | NC | + | + | NC |
| | Ebb | 2.4 | 1.0 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | - | NC |
| 9 | Flood | 1.0 | 1.4 | NC | - | NC | - | NC | - | NC | - | - | - | NC | - | - | - |
| | Ebb | 2.1 | 1.0 | - | NC | - | NC | NC | NC | NC | NC | - | - | - | NC | - | NC |
| 10 | Flood | 0.7 | 1.2 | NC | + | NC | NC | NC | NC | + | NC | NC | NC | NC | NC | NC | NC |
| | Ebb | 0.8 | 2.3 | + | NC | NC | NC | NC | + | NC | - | NC | NC | + | NC | NC | NC |

Note: Key to changes (plan-base):

| Symbols | Differences |
|---|---|
| NC | ≤ ± 0.3 fps (No change) |
| + | 0.4 to 1.0 fps increase |
| ++ | >1.0 fps increase |
| - | 0.4 to 1.0 fps decrease |

Table 2

Changes to Percent Total Flow Downstream Caused by Plans 1-7

| Station | Base, % Downstream | | Plan 1 | | Plan 2 | | Plan 3 | | Plan 4 | | Plan 5 | | Plan 6 | | Plan 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sur | Bot | Sur | Bot | Sur | Bot | Sur | Bot | Sur | Bot | Sur | Bot | Sur | Bot | Sur | Bot |
| 1 | 41.9 | 40.2 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 2 | 40.4 | 25.9 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 3 | 60.2 | 27.3 | - | NC | - | + | - | NC | - | NC | - | NC | - | NC | NC | NC |
| 4 | 62.1 | 19.4 | NC | ++ | - | NC | NC | ++ | NC | ++ | NC | ++ | NC | ++ | NC | NC |
| 5 | 61.0 | 21.8 | NC | + | NC | NC | NC | NC | NC | NC | NC | NC | -- | NC | + | NC |
| 6 | 66.7 | 11.6 | + | ++ | NC | ++ | NC | NC | NC | + | NC | + | NC | + | NC | NC |
| 7 | 31.6 | 29.4 | - | NC | NC | NC | - | NC | NC | - | NC | - | - | - | NC | - |
| 8 | 91.5 | 26.5 | NC | - | NC | NC | NC | NC | NC | NC | NC | - | NC | NC | -- | NC |
| 9 | 68.3 | 39.6 | NC | + | NC | NC | NC | NC | NC | ++ | NC | - | NC | NC | NC | NC |
| 10 | 60.4 | 46.6 | NC | NC | NC | NC | NC | NC | NC | NC | NC | + | NC | NC | NC | NC |

Note: Key to changes (plan-base):

| Symbols | Difference |
|---|---|
| NC | ≤ ± 10% (No change) |
| + | 10 to 20% increase in flow downstream |
| ++ | >20% increase in flow downstream |
| - | 10 to 20% decrease in flow downstream |
| -- | >20% decrease in flow downstream |

Table 3

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 1, Surface

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 2.9 | 2.3 | 2.3 | 2.0 | 2.4 | 2.2 | 2.5 | 2.2 |
| 1.0 | 3.4 | 3.1 | 3.3 | 3.1 | 2.8 | 3.1 | 2.8 | 3.0 |
| 2.0 | 3.6 | 3.6 | 3.1 | 3.5 | 3.2 | 3.4 | 3.3 | 3.5 |
| 3.0 | 3.7 | 3.7 | 3.3 | 3.6 | 3.3 | 3.5 | 3.4 | 3.7 |
| 4.0 | 3.6 | 3.7 | 3.4 | 3.4 | 3.1 | 3.5 | 3.1 | 3.5 |
| 5.0 | 3.2 | 3.1 | 3.0 | 3.3 | 3.0 | 3.1 | 2.8 | 3.2 |
| 6.0 | 3.3 | 2.9 | 2.9 | 2.9 | 2.8 | 3.0 | 2.5 | 3.0 |
| 7.0 | 2.8 | 2.6 | 2.5 | 2.9 | 2.8 | 2.7 | 2.5 | 2.6 |
| 8.0 | 2.3 | 2.4 | 2.1 | 1.8 | 1.8 | 1.9 | 1.4 | 1.7 |
| 9.0 | 1.5 | 0.5 | 1.2 | 0.9 | 1.2 | 1.2 | 0.7 | 0.5 |
| 10.0 | 0.3 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.3 |
| 11.0 | -0.5 | -0.1 | -0.4 | -0.1 | -0.1 | -0.1 | -0.4 | -0.2 |
| 12.0 | -1.8 | -1.5 | -1.3 | -1.3 | -1.4 | -1.2 | -1.3 | -1.2 |
| 13.0 | -2.3 | -2.1 | -1.9 | -1.9 | -1.9 | -1.9 | -1.9 | -2.2 |
| 14.0 | -2.8 | -2.3 | -2.5 | -2.2 | -2.2 | -2.4 | -1.9 | -2.6 |
| 15.0 | -2.9 | -2.6 | -2.6 | -2.5 | -2.5 | -2.5 | -2.4 | -2.6 |
| 16.0 | -2.8 | -2.7 | -2.3 | -2.5 | -2.6 | -2.5 | -2.5 | -2.7 |
| 17.0 | -2.8 | -2.8 | -2.5 | -2.4 | -2.7 | -2.5 | -2.3 | -2.6 |
| 18.0 | -2.5 | -2.7 | -2.4 | -2.4 | -2.4 | -2.3 | -2.2 | -2.5 |
| 19.0 | -1.9 | -2.1 | -2.1 | -2.2 | -1.9 | -2.1 | -1.9 | -2.3 |
| 20.0 | -1.8 | -1.7 | -1.6 | -1.9 | -1.4 | -1.8 | -1.2 | -1.7 |
| 21.0 | -1.0 | -1.3 | -0.9 | -1.3 | -1.1 | -1.3 | -0.8 | -1.1 |
| 22.0 | -0.6 | -0.7 | -0.1 | -0.5 | -0.4 | -0.4 | -0.2 | -0.5 |
| 23.0 | 0.6 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.1 |
| 24.0 | 2.3 | 0.5 | 0.6 | 0.2 | 0.8 | 0.2 | 1.3 | 0.3 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 3.0 | 3.7 | 15.0 | -2.9 | 41.9 |
| Plan 1 | 3.0 | 3.7 | 17.0 | -2.8 | 44.2 |
| Plan 2 | 4.0 | 3.4 | 15.0 | -2.6 | 42.6 |
| Plan 3 | 3.0 | 3.6 | 15.0 | -2.5 | 43.4 |
| Plan 4 | 3.0 | 3.3 | 17.0 | -2.7 | 43.1 |
| Plan 5 | 3.0 | 3.5 | 15.0 | -2.5 | 43.3 |
| Plan 6 | 3.0 | 3.4 | 16.0 | -2.5 | 42.1 |
| Plan 7 | 3.0 | 3.7 | 16.0 | -2.7 | 44.9 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 4

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 1, Bottom

| | Velocity, fps | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time hr* | Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
| 0.0 | 1.6 | 1.3 | 1.3 | 1.5 | 1.9 | 1.3 | 2.1 | 1.7 |
| 1.0 | 2.3 | 2.5 | 2.7 | 2.3 | 1.9 | 1.9 | 2.5 | 2.3 |
| 2.0 | 3.1 | 2.7 | 2.7 | 2.4 | 2.8 | 2.8 | 3.0 | 2.7 |
| 3.0 | 2.9 | 3.0 | 2.7 | 2.6 | 2.8 | 2.8 | 2.8 | 3.1 |
| 4.0 | 2.7 | 3.1 | 2.7 | 2.8 | 2.8 | 2.8 | 2.7 | 3.4 |
| 5.0 | 2.5 | 3.0 | 2.7 | 2.8 | 2.7 | 2.8 | 2.7 | 3.1 |
| 6.0 | 2.7 | 2.8 | 2.5 | 2.5 | 2.6 | 2.6 | 2.4 | 2.9 |
| 7.0 | 2.6 | 2.6 | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.6 |
| 8.0 | 2.3 | 1.7 | 1.8 | 1.8 | 2.0 | 1.7 | 1.7 | 2.0 |
| 9.0 | 1.3 | 1.3 | 0.8 | 1.2 | 1.3 | 1.1 | 0.9 | 1.0 |
| 10.0 | 0.3 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | -0.1 | 0.2 |
| 11.0 | -0.3 | -0.4 | -0.2 | -0.3 | -0.5 | -0.1 | -0.8 | -0.7 |
| 12.0 | -0.9 | -0.6 | -1.0 | -0.7 | -1.4 | -1.0 | -1.4 | -1.1 |
| 13.0 | -1.7 | -1.7 | -1.6 | -1.3 | -1.7 | -1.6 | -1.7 | -1.7 |
| 14.0 | -2.2 | -1.9 | -2.2 | -1.9 | -2.1 | -2.4 | -2.1 | -2.0 |
| 15.0 | -2.3 | -2.0 | -2.2 | -2.1 | -2.1 | -2.3 | -2.1 | -2.5 |
| 16.0 | -2.4 | -2.1 | -2.2 | -2.1 | -2.4 | -2.3 | -2.4 | -2.3 |
| 17.0 | -2.3 | -2.3 | -2.3 | -1.9 | -2.2 | -2.2 | -2.3 | -2.3 |
| 18.0 | -1.8 | -2.2 | -2.1 | -2.2 | -2.1 | -2.5 | -2.1 | -1.7 |
| 19.0 | -1.8 | -2.4 | -1.9 | -2.4 | -2.0 | -2.5 | -2.2 | -1.5 |
| 20.0 | -0.8 | -2.1 | -1.8 | -1.9 | -1.7 | -1.9 | -1.9 | -1.2 |
| 21.0 | -0.4 | -1.0 | -1.0 | -1.1 | -1.0 | -1.2 | -0.5 | -0.7 |
| 22.0 | -0.3 | -0.1 | -0.1 | -0.3 | -0.1 | -0.1 | 0.1 | -0.2 |
| 23.0 | 0.4 | 0.2 | 0.3 | 0.3 | 0.8 | 0.2 | 0.7 | 0.6 |
| 24.0 | 0.9 | 0.8 | 1.0 | 1.0 | 1.3 | 0.7 | 1.2 | 1.1 |

| | Maximum Flood | | Maximum Ebb | | |
|---|---|---|---|---|---|
| Plan | Time hr | Velocity fps | Time hr | Velocity fps | % Total Flow Downstream |
| Base | 2.0 | 3.1 | 16.0 | -2.4 | 40.2 |
| Plan 1 | 4.0 | 3.1 | 19.0 | -2.4 | 42.7 |
| Plan 2 | 3.0 | 2.7 | 17.0 | -2.3 | 44.3 |
| Plan 3 | 4.0 | 2.8 | 19.0 | -2.4 | 43.8 |
| Plan 4 | 2.0 | 2.8 | 16.0 | -2.4 | 43.7 |
| Plan 5 | 2.0 | 2.8 | 18.0 | -2.5 | 46.8 |
| Plan 6 | 2.0 | 3.0 | 16.0 | -2.4 | 44.4 |
| Plan 7 | 4.0 | 3.4 | 15.0 | -2.5 | 40.4 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 5

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 2, Surface

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 1.3 | 1.1 | 1.4 | 0.8 | 0.9 | 1.1 | 1.1 | 1.0 |
| 1.0 | 2.3 | 1.4 | 1.7 | 1.6 | 1.5 | 1.6 | 1.4 | 1.3 |
| 2.0 | 2.3 | 2.0 | 1.9 | 2.1 | 1.8 | 1.9 | 1.9 | 1.6 |
| 3.0 | 2.3 | 2.1 | 1.9 | 2.1 | 1.9 | 1.9 | 1.9 | 2.0 |
| 4.0 | 2.3 | 2.0 | 1.9 | 2.0 | 1.7 | 1.9 | 1.6 | 2.1 |
| 5.0 | 1.9 | 1.7 | 1.7 | 1.7 | 1.7 | 1.9 | 1.5 | 1.9 |
| 6.0 | 1.9 | 1.6 | 1.6 | 1.5 | 1.3 | 1.6 | 1.3 | 1.7 |
| 7.0 | 1.6 | 1.4 | 1.4 | 1.4 | 1.3 | 1.5 | 1.1 | 1.4 |
| 8.0 | 1.4 | 1.2 | 1.1 | 1.1 | 0.9 | 1.2 | 0.8 | 1.1 |
| 9.0 | 0.8 | 0.9 | 0.4 | 0.5 | 0.6 | 0.8 | 0.5 | 0.7 |
| 10.0 | 0.3 | 0.4 | 0.1 | 0.1 | -0.1 | 0.1 | 0.1 | 0.2 |
| 11.0 | -0.3 | 0.1 | -0.2 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 |
| 12.0 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | -0.5 | -0.4 |
| 13.0 | -0.8 | -0.5 | -0.5 | -0.1 | -0.9 | -0.6 | -1.0 | -0.5 |
| 14.0 | -1.3 | -0.8 | -0.7 | -0.7 | -0.9 | -0.8 | -0.9 | -0.8 |
| 15.0 | -1.4 | -0.9 | -1.1 | -1.0 | -1.0 | -1.1 | -0.8 | -1.2 |
| 16.0 | -1.7 | -1.0 | -1.0 | -1.2 | -1.0 | -1.2 | -0.8 | -1.4 |
| 17.0 | -2.0 | -1.2 | -0.8 | -1.1 | -1.0 | -1.3 | -1.1 | -1.6 |
| 18.0 | -1.4 | -1.3 | -0.9 | -1.2 | -1.0 | -1.2 | -1.3 | -1.8 |
| 19.0 | -1.5 | -1.2 | -0.8 | -1.3 | -0.8 | -1.2 | -1.1 | -1.3 |
| 20.0 | -1.3 | -0.8 | -0.5 | -0.9 | -0.7 | -1.0 | -1.0 | -1.1 |
| 21.0 | -0.8 | -0.2 | -0.2 | -0.8 | -0.3 | -0.7 | -0.2 | -0.7 |
| 22.0 | -0.3 | -0.1 | -0.1 | -0.1 | -0.0 | -0.3 | -0.1 | -0.5 |
| 23.0 | 0.3 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| 24.0 | 0.6 | 0.2 | 0.8 | 0.1 | 0.1 | 0.1 | 0.2 | 0.5 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 2.0 | 2.3 | 17.0 | -2.0 | 40.4 |
| Plan 1 | 3.0 | 2.1 | 18.0 | -1.3 | 34.5 |
| Plan 2 | 2.0 | 1.9 | 15.0 | -1.1 | 31.1 |
| Plan 3 | 3.0 | 2.1 | 19.0 | -1.3 | 36.8 |
| Plan 4 | 3.0 | 1.9 | 15.0 | -1.0 | 36.9 |
| Plan 5 | 2.0 | 1.9 | 17.0 | -1.3 | 38.4 |
| Plan 6 | 2.0 | 1.9 | 18.0 | -1.3 | 40.6 |
| Plan 7 | 4.0 | 2.1 | 18.0 | -1.8 | 42.1 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 6

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 2, Bottom

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.9 | 0.8 | 0.7 | 0.4 | 0.7 | 0.7 | 0.9 | 1.1 |
| 1.0 | 1.1 | 1.2 | 0.8 | 0.8 | 0.8 | 1.0 | 0.9 | 0.9 |
| 2.0 | 1.3 | 1.2 | 1.3 | 0.8 | 1.0 | 0.9 | 1.0 | 1.0 |
| 3.0 | 1.6 | 1.4 | 1.2 | 0.8 | 1.0 | 1.1 | 0.8 | 1.3 |
| 4.0 | 1.6 | 1.4 | 1.3 | 1.1 | 1.1 | 1.1 | 1.2 | 1.3 |
| 5.0 | 1.9 | 1.4 | 1.3 | 1.3 | 1.4 | 1.3 | 1.3 | 1.4 |
| 6.0 | 1.8 | 1.3 | 1.3 | 1.2 | 1.2 | 1.3 | 1.3 | 1.4 |
| 7.0 | 1.5 | 1.4 | 1.1 | 1.0 | 1.1 | 1.3 | 1.1 | 1.3 |
| 8.0 | 1.3 | 1.1 | 1.0 | 1.2 | 0.8 | 1.1 | 0.6 | 1.2 |
| 9.0 | 0.9 | 0.8 | 0.8 | 0.4 | 0.5 | 0.5 | 0.5 | 1.0 |
| 10.0 | 0.3 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.4 |
| 11.0 | -0.3 | -0.1 | 0.1 | 0.1 | -0.1 | 0.1 | -0.1 | 0.1 |
| 12.0 | -0.3 | -0.1 | -0.1 | -0.1 | -0.2 | -0.1 | -0.3 | -0.1 |
| 13.0 | -0.5 | -0.2 | -0.4 | -0.1 | -0.2 | -0.3 | -0.5 | -0.1 |
| 14.0 | -0.9 | -0.5 | -0.5 | -0.6 | -0.7 | -0.8 | -0.7 | -0.7 |
| 15.0 | -0.9 | -0.7 | -0.5 | -0.7 | -0.9 | -0.8 | -0.8 | -0.8 |
| 16.0 | -0.8 | -0.8 | -0.7 | -0.7 | -0.8 | -1.0 | -0.8 | -0.8 |
| 17.0 | -0.4 | -0.7 | -0.1 | -0.3 | -0.8 | -0.7 | -0.7 | -0.7 |
| 18.0 | -0.3 | -0.2 | -0.1 | -0.1 | -0.5 | -0.1 | -0.2 | -0.3 |
| 19.0 | -0.3 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 |
| 20.0 | -0.3 | -0.2 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 |
| 21.0 | -0.3 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | 0.1 | -0.1 |
| 22.0 | 0.3 | 0.1 | 0.1 | -0.1 | 0.1 | 0.2 | 0.1 | 0.1 |
| 23.0 | 0.6 | 0.1 | 0.1 | 0.2 | 0.1 | 0.9 | 0.1 | 0.5 |
| 24.0 | 0.8 | 0.5 | 0.7 | 0.2 | 0.7 | 0.9 | 0.8 | 0.8 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 5.0 | 1.9 | 14.0 | -0.9 | 25.9 |
| Plan 1 | 7.0 | 1.4 | 16.0 | -0.8 | 23.5 |
| Plan 2 | 2.0 | 1.3 | 16.0 | -0.7 | 20.1 |
| Plan 3 | 5.0 | 1.3 | 15.0 | -0.7 | 25.5 |
| Plan 4 | 5.0 | 1.4 | 15.0 | -0.9 | 31.2 |
| Plan 5 | 5.0 | 1.3 | 16.0 | -1.0 | 25.7 |
| Plan 6 | 5.0 | 1.3 | 15.0 | -0.8 | 28.7 |
| Plan 7 | 5.0 | 1.4 | 16.0 | -0.8 | 22.6 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 7

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 3, Surface

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.2 | 1.0 | 0.7 | 1.1 | 1.1 | 1.2 | 1.0 | 0.4 |
| 1.0 | 0.8 | 1.6 | 1.3 | 1.3 | 1.3 | 1.2 | 1.6 | 1.0 |
| 2.0 | 0.8 | 1.5 | 1.4 | 1.5 | 1.7 | 1.7 | 1.3 | 1.2 |
| 3.0 | 0.8 | 1.6 | 1.2 | 1.6 | 1.8 | 1.6 | 1.6 | 1.4 |
| 4.0 | 0.8 | 1.9 | 1.2 | 1.8 | 1.8 | 1.6 | 1.5 | 1.2 |
| 5.0 | 0.9 | 1.6 | 1.2 | 1.6 | 1.7 | 1.6 | 1.5 | 1.0 |
| 6.0 | 1.2 | 1.5 | 1.1 | 1.6 | 1.7 | 1.4 | 1.4 | 0.8 |
| 7.0 | 1.2 | 1.6 | 1.1 | 1.6 | 1.5 | 1.5 | 1.3 | 1.1 |
| 8.0 | 1.0 | 1.3 | 1.1 | 1.5 | 1.4 | 1.4 | 1.2 | 1.3 |
| 9.0 | 0.7 | 1.1 | 0.8 | 1.0 | 1.0 | 1.1 | 0.8 | 1.0 |
| 10.0 | 0.1 | 0.8 | 0.7 | 0.8 | 0.6 | 0.8 | 0.6 | 0.7 |
| 11.0 | -0.2 | 0.3 | 0.2 | 0.5 | 0.3 | 0.4 | 0.4 | 0.1 |
| 12.0 | -0.7 | -0.3 | -0.4 | 0.3 | -0.3 | -0.3 | -0.3 | -0.7 |
| 13.0 | -1.0 | -0.6 | -0.5 | -0.6 | -0.6 | -0.6 | -0.5 | -1.1 |
| 14.0 | -1.4 | -1.3 | -1.3 | -1.2 | -1.2 | -1.2 | -1.2 | -1.7 |
| 15.0 | -1.8 | -1.7 | -1.2 | -1.6 | -1.5 | -1.7 | -1.3 | -1.7 |
| 16.0 | -1.8 | -1.6 | -1.7 | -1.7 | -1.8 | -1.8 | -1.9 | -1.6 |
| 17.0 | -1.8 | -1.7 | -1.7 | -2.3 | -1.9 | -1.8 | -1.7 | -1.5 |
| 18.0 | -1.4 | -2.0 | -1.2 | -1.9 | -1.8 | -1.5 | -1.5 | -1.7 |
| 19.0 | -1.1 | -1.8 | -1.0 | -1.9 | -1.9 | -1.6 | -1.5 | -1.3 |
| 20.0 | -0.8 | -1.8 | -0.8 | -1.8 | -1.7 | -1.8 | -1.1 | -0.9 |
| 21.0 | -0.6 | -1.5 | -0.9 | -1.4 | -1.3 | -1.4 | -0.8 | -0.7 |
| 22.0 | -0.5 | -0.8 | -0.4 | -0.8 | -0.8 | -0.7 | -0.6 | -0.3 |
| 23.0 | -0.2 | -0.8 | 0.2 | -0.7 | -0.4 | -0.7 | -0.3 | 0.1 |
| 24.0 | 0.2 | 0.3 | 0.6 | 0.5 | -0.3 | 0.4 | 0.4 | 0.3 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 6.0 | 1.2 | 15.0 | -1.8 | 60.2 |
| Plan 1 | 4.0 | 1.9 | 18.0 | -2.0 | 49.7 |
| Plan 2 | 2.0 | 1.4 | 16.0 | -1.7 | 46.3 |
| Plan 3 | 4.0 | 1.8 | 17.0 | -2.3 | 49.2 |
| Plan 4 | 4.0 | 1.8 | 17.0 | -1.9 | 49.8 |
| Plan 5 | 2.0 | 1.7 | 17.0 | -1.8 | 49.2 |
| Plan 6 | 1.0 | 1.6 | 16.0 | -1.9 | 46.9 |
| Plan 7 | 3.0 | 1.4 | 14.0 | -1.7 | 53.0 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 8

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 3, Bottom

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 1.0 | 1.2 | 0.9 | 1.4 | 1.3 | 1.3 | 1.2 | 1.3 |
| 1.0 | 0.9 | 1.5 | 0.9 | 1.4 | 1.3 | 1.4 | 1.4 | 1.1 |
| 2.0 | 1.0 | 1.3 | 0.6 | 1.1 | 1.3 | 1.2 | 1.3 | 0.9 |
| 3.0 | 0.7 | 1.3 | 0.6 | 1.3 | 1.3 | 1.2 | 1.2 | 0.8 |
| 4.0 | 0.5 | 1.2 | 0.6 | 1.3 | 1.3 | 1.2 | 1.2 | 0.7 |
| 5.0 | 0.5 | 1.3 | 0.6 | 1.3 | 0.9 | 1.2 | 1.0 | 0.9 |
| 6.0 | 1.0 | 0.9 | 0.6 | 1.3 | 1.3 | 1.2 | 1.2 | 1.0 |
| 7.0 | 0.9 | 1.6 | 0.6 | 1.3 | 1.1 | 1.4 | 1.1 | 0.9 |
| 8.0 | 0.9 | 1.4 | 0.6 | 1.2 | 1.1 | 1.1 | 1.0 | 0.6 |
| 9.0 | 0.8 | 1.0 | 0.4 | 1.0 | 0.8 | 0.9 | 0.8 | 0.7 |
| 10.0 | 0.5 | 0.7 | 0.2 | 0.6 | 0.6 | 0.6 | 0.5 | 0.3 |
| 11.0 | 0.2 | 0.3 | -0.4 | 0.4 | 0.3 | 0.4 | 0.3 | 0.1 |
| 12.0 | -0.2 | 0.3 | -0.4 | 0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| 13.0 | -0.2 | -0.4 | -0.6 | -0.4 | -0.7 | -0.4 | -0.6 | -0.4 |
| 14.0 | -0.2 | -0.7 | -0.6 | -0.6 | -0.7 | -0.6 | -0.8 | -0.3 |
| 15.0 | -0.2 | -0.6 | -0.6 | -0.7 | -0.6 | -0.6 | -0.7 | -0.5 |
| 16.0 | -0.3 | -0.7 | -0.7 | -0.7 | -0.7 | -0.6 | -0.7 | -0.4 |
| 17.0 | -0.6 | -0.7 | -0.8 | -0.8 | -0.6 | -0.5 | -0.7 | -0.9 |
| 18.0 | -0.6 | -0.5 | -0.7 | -0.5 | -0.5 | -0.4 | -0.5 | -0.9 |
| 19.0 | -0.5 | -0.4 | -0.6 | -0.4 | -0.4 | -0.3 | -0.6 | -1.0 |
| 20.0 | -0.5 | 0.4 | -0.4 | 0.4 | -0.3 | 0.3 | -0.4 | -0.7 |
| 21.0 | -0.2 | 0.6 | 0.2 | 0.5 | 0.4 | 0.4 | 0.3 | -0.5 |
| 22.0 | -0.2 | 0.9 | 0.6 | 0.8 | 0.8 | 0.9 | 0.8 | 0.1 |
| 23.0 | 0.4 | 1.1 | 1.0 | 0.9 | 0.8 | 1.2 | 0.9 | 0.3 |
| 24.0 | 0.9 | 1.0 | 1.0 | 1.1 | 1.3 | 1.2 | 1.1 | 1.1 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 0.0 | 1.0 | 17.0 | -0.6 | 27.3 |
| Plan 1 | 7.0 | 1.6 | 14.0 | -0.7 | 17.9 |
| Plan 2 | 23.0 | 1.0 | 17.0 | -0.8 | 38.3 |
| Plan 3 | 0.0 | 1.4 | 17.0 | -0.8 | 19.1 |
| Plan 4 | 0.0 | 1.3 | 13.0 | -0.7 | 23.4 |
| Plan 5 | 1.0 | 1.4 | 16.0 | -0.6 | 17.4 |
| Plan 6 | 1.0 | 1.4 | 14.0 | -0.8 | 25.9 |
| Plan 7 | 0.0 | 1.3 | 19.0 | -1.0 | 35.8 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 9

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 4, Surface

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.4 | 0.5 | 0.5 | 0.4 | 1.0 | 0.6 | 0.5 | 0.2 |
| 1.0 | 0.8 | 0.8 | 0.9 | 0.6 | 1.8 | 0.6 | 0.7 | 0.3 |
| 2.0 | 0.8 | 1.5 | 1.0 | 1.6 | 2.0 | 1.1 | 1.2 | 0.8 |
| 3.0 | 0.6 | 1.8 | 1.0 | 1.5 | 1.4 | 1.3 | 1.5 | 0.8 |
| 4.0 | 0.3 | 1.8 | 1.0 | 1.5 | 1.4 | 1.6 | 1.5 | 0.7 |
| 5.0 | 0.3 | 1.6 | 0.9 | 1.6 | 1.3 | 1.5 | 1.7 | 0.8 |
| 6.0 | 0.4 | 1.8 | 0.7 | 1.7 | 1.3 | 1.5 | 1.5 | 1.3 |
| 7.0 | 0.3 | 1.4 | 0.7 | 1.5 | 1.3 | 1.5 | 1.3 | 1.0 |
| 8.0 | 0.1 | 1.1 | 0.7 | 1.1 | 1.0 | 1.2 | 1.0 | 0.8 |
| 9.0 | 0.1 | 0.9 | 0.7 | 0.8 | 0.7 | 0.7 | 0.7 | 0.6 |
| 10.0 | 0.1 | 0.5 | 0.5 | 0.5 | -0.3 | 0.6 | 0.3 | 0.2 |
| 11.0 | 0.1 | -0.3 | 0.2 | -0.4 | -0.6 | -0.3 | -0.3 | -0.2 |
| 12.0 | -0.3 | -0.4 | -0.4 | -0.4 | -1.1 | -0.6 | -0.8 | -0.3 |
| 13.0 | -0.6 | -1.1 | -0.6 | -1.3 | -1.6 | -1.5 | -1.4 | -0.8 |
| 14.0 | -0.9 | -1.6 | -0.8 | -1.9 | -1.6 | -1.8 | -1.6 | -0.8 |
| 15.0 | -0.6 | -2.1 | -0.6 | -2.1 | -1.8 | -1.8 | -1.7 | -0.8 |
| 16.0 | -0.8 | -2.5 | -0.9 | -2.0 | -1.6 | -1.9 | -1.8 | -1.0 |
| 17.0 | -0.8 | -2.2 | -0.9 | -2.1 | -1.8 | -2.0 | -1.9 | -1.1 |
| 18.0 | -0.8 | -2.2 | -0.7 | -2.2 | -1.8 | -1.8 | -2.0 | -1.2 |
| 19.0 | -0.8 | -2.2 | -0.8 | -2.1 | -1.6 | -1.6 | -1.8 | -1.0 |
| 20.0 | -0.8 | -1.8 | -0.6 | -1.8 | -1.6 | -1.7 | -1.8 | -0.8 |
| 21.0 | -0.7 | -1.6 | -0.6 | -1.6 | -1.0 | -1.6 | -1.3 | -0.6 |
| 22.0 | -0.3 | -1.0 | -0.4 | -1.0 | -0.4 | -1.1 | -0.9 | -0.5 |
| 23.0 | 0.1 | -0.4 | 0.2 | -0.4 | 0.3 | -0.6 | -0.6 | -0.3 |
| 24.0 | 0.3 | 0.3 | 0.4 | 0.4 | 0.6 | 0.4 | -0.3 | -0.3 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 1.0 | 0.8 | 14.0 | -0.9 | 62.1 |
| Plan 1 | 3.0 | 1.8 | 16.0 | -2.5 | 58.3 |
| Plan 2 | 2.0 | 1.0 | 16.0 | -0.9 | 43.8 |
| Plan 3 | 6.0 | 1.7 | 18.0 | -2.2 | 59.7 |
| Plan 4 | 2.0 | 2.0 | 18.0 | -1.8 | 54.3 |
| Plan 5 | 4.0 | 1.6 | 17.0 | -2.0 | 59.0 |
| Plan 6 | 5.0 | 1.7 | 18.0 | -2.0 | 61.0 |
| Plan 7 | 6.0 | 1.3 | 18.0 | -1.2 | 56.3 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 10

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 4, Bottom

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 1.1 | 1.0 | 0.7 | 0.9 | 1.2 | 1.3 | 1.3 | 1.1 |
| 1.0 | 1.2 | 1.5 | 1.2 | 1.6 | 1.7 | 1.5 | 1.6 | 1.5 |
| 2.0 | 1.4 | 1.5 | 1.1 | 1.6 | 1.8 | 1.5 | 1.7 | 1.7 |
| 3.0 | 1.2 | 1.3 | 1.2 | 1.3 | 1.5 | 1.2 | 1.5 | 1.7 |
| 4.0 | 1.2 | 0.9 | 0.9 | 1.3 | 1.3 | 0.7 | 1.1 | 1.7 |
| 5.0 | 1.1 | 0.9 | 0.8 | 1.1 | 1.2 | 0.8 | 1.1 | 1.7 |
| 6.0 | 1.1 | 0.8 | 0.9 | 0.9 | 1.1 | 0.7 | 0.9 | 1.6 |
| 7.0 | 1.0 | 0.9 | 0.9 | 0.9 | 1.0 | 0.7 | 0.9 | 1.4 |
| 8.0 | 0.9 | 0.7 | 0.9 | 0.8 | 1.0 | 0.5 | 0.8 | 1.3 |
| 9.0 | 1.0 | 0.5 | 0.9 | 0.4 | 0.8 | 0.5 | 0.6 | 1.2 |
| 10.0 | 0.9 | 0.3 | 0.8 | 0.4 | 0.4 | 0.4 | 0.4 | 1.0 |
| 11.0 | 0.8 | 0.3 | 0.6 | -0.4 | 0.3 | -0.3 | -0.3 | 0.9 |
| 12.0 | 0.4 | -0.4 | 0.4 | -0.7 | -0.5 | -0.4 | -0.4 | 0.5 |
| 13.0 | -0.1 | -0.5 | 0.2 | -0.7 | -0.9 | -0.4 | -0.9 | 0.3 |
| 14.0 | -0.1 | -0.9 | 0.2 | -0.9 | -1.1 | -0.6 | -0.9 | -0.6 |
| 15.0 | -0.8 | -1.0 | -0.4 | -1.2 | -1.3 | -0.8 | -1.2 | -0.3 |
| 16.0 | -0.7 | -1.0 | -0.6 | -1.3 | -1.4 | -1.1 | -1.4 | -0.6 |
| 17.0 | -0.4 | -1.2 | -0.6 | -1.3 | -1.4 | -1.2 | -1.5 | -0.7 |
| 18.0 | -0.4 | -1.4 | -0.5 | -1.3 | -1.3 | -1.2 | -1.3 | -0.7 |
| 19.0 | -0.4 | -1.0 | -0.4 | -1.4 | -1.2 | -1.3 | -1.3 | -0.3 |
| 20.0 | -0.4 | -0.8 | -0.4 | -1.3 | -1.0 | -1.1 | -1.2 | -0.3 |
| 21.0 | 0.1 | -0.5 | -0.4 | -0.9 | -0.8 | -0.6 | -0.9 | 0.1 |
| 22.0 | 0.1 | -0.3 | 0.2 | -0.6 | -0.5 | -0.4 | -0.7 | 0.3 |
| 23.0 | 0.4 | 0.3 | 0.2 | 0.4 | 0.3 | 0.4 | -0.4 | 0.7 |
| 24.0 | 0.7 | 0.8 | 0.4 | 0.5 | 0.8 | 1.2 | 0.3 | 0.9 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 2.0 | 1.4 | 15.0 | -0.8 | 19.4 |
| Plan 1 | 1.0 | 1.5 | 18.0 | -1.4 | 43.7 |
| Plan 2 | 1.0 | 1.2 | 16.0 | -0.6 | 20.1 |
| Plan 3 | 1.0 | 1.6 | 19.0 | -1.4 | 50.2 |
| Plan 4 | 2.0 | 1.8 | 16.0 | -1.4 | 44.9 |
| Plan 5 | 1.0 | 1.5 | 19.0 | -1.3 | 45.7 |
| Plan 6 | 2.0 | 1.7 | 17.0 | -1.5 | 51.3 |
| Plan 7 | 2.0 | 1.7 | 17.0 | -0.7 | 15.4 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 11

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 5, Surface

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | -0.3 | -0.3 | 0.6 | 0.3 | 0.4 | 0.4 | 0.3 | 0.1 |
| 1.0 | 0.3 | 0.3 | 0.9 | 0.4 | 0.5 | 0.5 | 0.9 | 0.1 |
| 2.0 | 0.4 | 0.5 | 1.0 | 0.6 | 0.8 | 0.8 | 1.0 | 0.3 |
| 3.0 | 0.7 | 0.6 | 0.5 | 0.9 | 1.0 | 0.8 | 1.0 | 0.5 |
| 4.0 | 0.7 | 0.6 | 0.9 | 0.6 | 1.1 | 1.0 | 1.0 | 0.5 |
| 5.0 | 0.7 | 0.7 | 0.6 | 0.4 | 0.9 | 0.9 | 0.8 | 0.5 |
| 6.0 | 0.7 | 0.6 | 0.5 | 0.5 | 0.7 | 0.5 | 0.6 | 0.2 |
| 7.0 | 0.8 | 0.5 | 0.5 | 0.4 | 0.5 | 0.4 | 0.6 | 0.3 |
| 8.0 | 0.6 | 0.6 | 0.4 | 0.3 | 0.2 | 0.4 | 0.4 | 0.2 |
| 9.0 | 0.4 | 0.5 | 0.4 | 0.3 | 0.2 | 0.4 | 0.3 | 0.2 |
| 10.0 | 0.3 | 0.3 | 0.4 | 0.3 | 0.2 | 0.3 | 0.1 | 0.2 |
| 11.0 | 0.3 | 0.2 | -0.3 | 0.2 | -0.1 | 0.3 | 0.1 | 0.1 |
| 12.0 | -0.3 | -0.3 | -0.3 | -0.3 | -0.1 | -0.5 | 0.1 | -0.2 |
| 13.0 | -0.8 | -0.4 | -0.3 | -0.3 | -0.3 | -0.1 | -0.1 | -0.3 |
| 14.0 | -0.9 | -0.6 | -0.6 | -0.6 | -0.5 | -0.8 | -0.1 | -0.6 |
| 15.0 | -0.8 | -1.2 | -0.9 | -0.7 | -0.8 | -1.1 | -0.1 | -1.2 |
| 16.0 | -0.8 | -1.2 | -0.9 | -0.9 | -0.8 | -1.1 | -0.5 | -1.3 |
| 17.0 | -1.0 | -1.2 | -1.1 | -1.0 | -0.9 | -1.3 | -0.7 | -1.4 |
| 18.0 | -1.0 | -1.3 | -1.2 | -1.1 | -1.1 | -1.3 | -0.8 | -1.4 |
| 19.0 | -1.0 | -1.4 | -1.0 | -1.2 | -0.9 | -1.2 | -0.7 | -1.4 |
| 20.0 | -0.8 | -1.2 | -1.0 | -0.6 | -0.8 | -1.0 | -0.4 | -1.1 |
| 21.0 | -0.8 | -1.2 | -0.9 | -0.6 | -0.5 | -0.7 | -0.3 | -0.9 |
| 22.0 | -0.4 | -0.9 | -0.0 | -0.4 | -0.2 | -0.4 | -0.1 | -0.7 |
| 23.0 | -0.3 | -0.6 | 0.4 | -0.3 | -0.1 | 0.3 | 0.1 | -0.6 |
| 24.0 | -0.3 | -0.3 | 0.4 | 0.2 | 0.2 | 0.3 | 0.1 | 0.1 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 7.0 | 0.8 | 17.0 | -1.0 | 61.0 |
| Plan 1 | 5.0 | 0.7 | 19.0 | -1.4 | 68.5 |
| Plan 2 | 2.0 | 1.0 | 18.0 | -1.2 | 54.1 |
| Plan 3 | 3.0 | 0.9 | 19.0 | -1.2 | 60.1 |
| Plan 4 | 4.0 | 1.1 | 18.0 | -1.1 | 51.8 |
| Plan 5 | 4.0 | 1.0 | 17.0 | -1.3 | 56.1 |
| Plan 6 | 2.0 | 1.0 | 18.0 | -0.8 | 34.7 |
| Plan 7 | 3.0 | 0.5 | 18.0 | -1.4 | 76.7 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 12

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 5, Bottom

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 | 1.0 | 0.1 | 0.3 |
| 1.0 | 0.5 | 0.6 | 0.6 | 0.5 | 0.4 | 1.0 | 0.4 | 0.8 |
| 2.0 | 0.5 | 1.2 | 0.7 | 1.0 | 0.8 | 1.1 | 0.7 | 0.8 |
| 3.0 | 0.5 | 1.1 | 0.9 | 1.1 | 1.0 | 1.1 | 0.8 | 0.8 |
| 4.0 | 0.6 | 1.2 | 1.1 | 1.2 | 0.8 | 1.1 | 0.7 | 0.9 |
| 5.0 | 0.4 | 0.8 | 1.2 | 0.9 | 0.8 | 1.0 | 0.8 | 0.8 |
| 6.0 | 0.4 | 0.8 | 0.9 | 0.8 | 0.7 | 0.8 | 0.8 | 0.3 |
| 7.0 | 0.4 | 0.6 | 0.9 | 0.7 | 0.6 | 0.5 | 0.4 | 0.2 |
| 8.0 | 0.4 | 0.4 | 0.7 | 0.6 | 0.5 | 0.4 | 0.5 | 0.2 |
| 9.0 | 0.4 | 0.2 | 0.5 | 0.5 | 0.5 | 0.4 | 0.5 | 0.2 |
| 10.0 | 0.3 | 0.2 | 0.4 | 0.3 | 0.5 | 0.4 | 0.4 | 0.2 |
| 11.0 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.1 |
| 12.0 | 0.1 | 0.2 | 0.3 | 0.2 | 0.2 | 0.3 | 0.1 | -0.1 |
| 13.0 | -0.1 | -0.3 | -0.3 | -0.3 | 0.1 | -0.3 | 0.1 | -0.1 |
| 14.0 | -0.2 | -0.3 | -0.3 | -0.3 | -0.1 | -0.3 | -0.1 | -0.1 |
| 15.0 | -0.3 | -0.3 | -0.3 | -0.3 | -0.1 | -0.3 | -0.1 | -0.1 |
| 16.0 | -0.1 | -0.3 | -0.3 | -0.3 | -0.2 | -0.4 | -0.1 | -0.1 |
| 17.0 | -0.1 | -0.3 | -0.3 | -0.3 | -0.1 | -0.4 | -0.1 | -0.1 |
| 18.0 | -0.1 | -0.3 | -0.3 | -0.3 | -0.1 | -0.4 | -0.1 | -0.1 |
| 19.0 | -0.1 | -0.5 | -0.3 | -0.6 | -0.2 | -0.4 | -0.1 | -0.1 |
| 20.0 | -0.1 | -0.9 | -0.4 | -0.5 | -0.4 | -0.4 | -0.2 | -0.1 |
| 21.0 | -0.1 | -0.7 | -0.4 | -0.5 | -0.2 | -0.4 | -0.2 | -0.1 |
| 22.0 | -0.1 | -0.6 | -0.3 | -0.3 | -0.2 | -0.3 | -0.2 | -0.1 |
| 23.0 | 0.1 | -0.3 | -0.3 | 0.2 | -0.1 | 0.3 | 0.1 | -0.1 |
| 24.0 | 0.2 | 0.2 | -0.3 | 0.3 | 0.1 | 0.3 | 0.1 | -0.2 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 4.0 | 0.6 | 15.0 | -0.3 | 21.8 |
| Plan 1 | 2.0 | 1.2 | 20.0 | -0.9 | 36.8 |
| Plan 2 | 5.0 | 1.2 | 20.0 | -0.4 | 31.2 |
| Plan 3 | 4.0 | 1.2 | 19.0 | -0.6 | 28.5 |
| Plan 4 | 3.0 | 1.0 | 20.0 | -0.4 | 20.7 |
| Plan 5 | 2.0 | 1.1 | 16.0 | -0.4 | 27.3 |
| Plan 6 | 5.0 | 0.8 | 20.0 | -0.2 | 17.4 |
| Plan 7 | 4.0 | 0.9 | 24.0 | -0.2 | 25.5 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 13

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 6, Surface

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | 0.3 | 0.1 | 0.2 |
| 1.0 | 0.5 | 0.2 | 0.4 | 0.3 | 0.3 | 0.4 | 0.1 | 0.3 |
| 2.0 | 0.6 | 0.2 | 0.4 | 0.3 | 0.5 | 0.6 | 0.1 | 0.4 |
| 3.0 | 0.5 | 0.2 | 0.5 | 0.3 | 0.6 | 0.4 | 0.5 | 0.5 |
| 4.0 | 0.4 | 0.2 | 0.4 | 0.3 | 0.6 | 0.4 | 0.4 | 0.3 |
| 5.0 | 0.4 | 0.2 | 0.6 | 0.3 | 1.0 | 0.4 | 0.7 | 0.3 |
| 6.0 | 0.5 | 0.2 | 0.9 | 0.4 | 0.9 | 0.6 | 0.6 | 0.6 |
| 7.0 | 0.5 | 0.3 | 0.7 | 0.6 | 0.7 | 0.4 | 0.5 | 0.7 |
| 8.0 | 0.5 | 0.2 | 0.4 | 0.4 | 0.5 | 0.4 | 0.3 | 0.8 |
| 9.0 | 0.3 | 0.2 | 0.4 | 0.4 | 0.5 | 0.4 | 0.1 | 0.6 |
| 10.0 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.1 | 0.5 |
| 11.0 | 0.2 | -0.3 | 0.3 | 0.2 | 0.1 | 0.3 | 0.1 | 0.3 |
| 12.0 | -0.2 | -0.3 | 0.3 | -0.3 | -0.1 | -0.3 | -0.1 | 0.2 |
| 13.0 | -0.4 | -0.3 | 0.0 | -0.3 | -0.3 | -0.3 | -0.1 | -0.3 |
| 14.0 | -0.9 | -0.8 | -0.3 | -0.4 | -0.5 | -0.4 | -0.5 | -0.4 |
| 15.0 | -1.1 | -1.4 | -1.0 | -1.1 | -0.8 | -1.1 | -1.1 | -0.9 |
| 16.0 | -1.4 | -1.4 | -1.3 | -1.2 | -1.3 | -1.5 | -1.1 | -1.3 |
| 17.0 | -1.0 | -1.5 | -1.4 | -1.5 | -1.3 | -1.7 | -1.4 | -1.2 |
| 18.0 | -0.7 | -1.0 | -1.2 | -1.2 | -1.3 | -1.3 | -1.1 | -1.3 |
| 19.0 | -0.9 | -0.8 | -0.9 | -0.9 | -0.9 | -1.2 | -1.0 | -1.0 |
| 20.0 | -0.9 | -0.7 | -1.0 | -0.9 | -0.8 | -1.1 | -1.0 | -0.8 |
| 21.0 | -0.9 | -0.6 | -0.9 | -0.8 | -0.8 | -1.1 | -0.7 | -0.6 |
| 22.0 | -0.5 | -0.4 | -0.5 | -0.7 | -0.5 | -1.1 | -0.4 | -0.3 |
| 23.0 | -0.2 | -0.3 | -0.3 | -0.3 | -0.1 | -0.8 | -0.3 | -0.3 |
| 24.0 | 0.0 | -0.3 | -0.3 | -0.3 | -0.1 | -0.5 | 0.1 | 0.2 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 2.0 | 0.6 | 16.0 | -1.4 | 66.7 |
| Plan 1 | 7.0 | 0.3 | 17.0 | -1.5 | 80.7 |
| Plan 2 | 6.0 | 0.9 | 17.0 | -1.4 | 60.1 |
| Plan 3 | 7.0 | 0.6 | 17.0 | -1.5 | 72.3 |
| Plan 4 | 5.0 | 1.0 | 16.0 | -1.3 | 58.8 |
| Plan 5 | 2.0 | 0.6 | 17.0 | -1.7 | 71.3 |
| Plan 6 | 5.0 | 0.7 | 17.0 | -1.4 | 69.2 |
| Plan 7 | 8.0 | 0.8 | 16.0 | -1.3 | 58.7 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 14

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 6, Bottom

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.3 | 0.2 | 0.3 | 0.2 | 0.4 | 0.4 | 0.1 | 0.8 |
| 1.0 | 0.6 | 0.2 | 0.6 | 0.3 | 0.4 | 0.7 | 0.2 | 0.9 |
| 2.0 | 0.8 | 0.6 | 0.8 | 0.6 | 0.6 | 1.0 | 0.5 | 1.1 |
| 3.0 | 0.8 | 0.6 | 0.8 | 0.6 | 0.7 | 0.9 | 0.6 | 1.1 |
| 4.0 | 0.8 | 0.6 | 0.9 | 0.6 | 0.5 | 1.0 | 0.7 | 1.1 |
| 5.0 | 0.7 | 0.6 | 1.0 | 0.8 | 0.6 | 1.0 | 0.6 | 1.1 |
| 6.0 | 0.5 | 0.6 | 1.0 | 0.8 | 0.8 | 1.0 | 0.5 | 1.1 |
| 7.0 | 0.4 | 0.6 | 0.9 | 0.7 | 0.8 | 0.9 | 0.6 | 1.1 |
| 8.0 | 0.3 | 0.6 | 0.9 | 0.2 | 0.7 | 0.8 | 0.5 | 0.8 |
| 9.0 | 0.2 | 0.5 | 0.9 | 0.3 | 0.5 | 0.4 | 0.4 | 0.7 |
| 10.0 | 0.2 | 0.2 | 0.7 | 0.2 | 0.4 | 0.3 | 0.4 | 0.6 |
| 11.0 | -0.0 | 0.2 | 0.4 | 0.2 | 0.1 | 0.3 | 0.2 | 0.3 |
| 12.0 | -0.0 | 0.2 | 0.3 | 0.2 | 0.1 | 0.3 | 0.1 | 0.3 |
| 13.0 | -0.0 | -0.3 | 0.3 | 0.1 | 0.1 | 0.3 | 0.1 | 0.3 |
| 14.0 | -0.1 | -0.3 | 0.3 | 0.1 | 0.1 | 0.3 | 0.1 | -0.3 |
| 15.0 | -0.1 | -0.3 | -0.3 | -0.2 | -0.1 | -0.3 | -0.1 | -0.3 |
| 16.0 | -0.3 | -0.3 | -0.3 | -0.2 | -0.1 | -0.3 | -0.1 | -0.3 |
| 17.0 | 0.0 | -0.4 | -0.5 | -0.2 | -0.1 | -0.4 | -0.1 | -0.3 |
| 18.0 | -0.1 | -0.7 | -0.9 | -0.2 | -0.5 | -0.4 | -0.5 | -0.3 |
| 19.0 | -0.1 | -0.6 | -0.9 | -0.2 | -0.6 | -0.6 | -0.6 | -0.3 |
| 20.0 | -0.1 | -0.6 | -1.0 | -0.5 | -0.5 | -0.4 | -0.4 | -0.3 |
| 21.0 | 0.0 | -0.5 | -0.9 | -0.2 | -0.2 | -0.4 | -0.4 | 0.3 |
| 22.0 | -0.1 | -0.3 | -0.5 | -0.2 | -0.2 | -0.3 | -0.1 | 0.4 |
| 23.0 | -0.0 | -0.3 | -0.3 | 0.2 | -0.1 | -0.3 | 0.1 | 0.6 |
| 24.0 | 0.2 | 0.2 | 0.3 | 0.2 | -0.1 | -0.3 | 0.1 | 0.6 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 2.0 | 0.8 | 16.0 | -0.3 | 11.6 |
| Plan 1 | 3.0 | 0.6 | 18.0 | -0.7 | 43.5 |
| Plan 2 | 5.0 | 1.0 | 20.0 | -1.0 | 35.4 |
| Plan 3 | 5.0 | 0.8 | 20.0 | -0.5 | 21.6 |
| Plan 4 | 6.0 | 0.8 | 19.0 | -0.6 | 29.9 |
| Plan 5 | 2.0 | 1.0 | 19.0 | -0.6 | 27.9 |
| Plan 6 | 4.0 | 0.7 | 19.0 | -0.6 | 29.3 |
| Plan 7 | 2.0 | 1.1 | 14.0 | -0.3 | 13.3 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 15

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 7, Surface

| Time hr* | Velocity, fps | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
| 0.0 | 0.6 | 0.4 | 0.5 | 0.5 | 0.5 | 0.7 | 0.3 | 0.2 |
| 1.0 | 0.6 | 0.8 | 0.7 | 0.7 | 1.1 | 0.8 | 0.7 | 1.0 |
| 2.0 | 0.8 | 1.2 | 1.0 | 1.1 | 1.1 | 1.1 | 0.7 | 1.0 |
| 3.0 | 0.9 | 1.6 | 0.8 | 0.8 | 0.9 | 0.9 | 0.7 | 0.8 |
| 4.0 | 0.7 | 1.0 | 0.5 | 0.5 | 0.8 | 0.6 | 0.5 | 0.6 |
| 5.0 | 0.6 | 0.7 | 0.6 | 0.6 | 0.6 | 0.5 | 0.4 | 0.6 |
| 6.0 | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.8 | 0.5 | 0.7 |
| 7.0 | 0.6 | 0.4 | 0.5 | 0.9 | 0.6 | 0.4 | 0.3 | 0.7 |
| 8.0 | 0.5 | 0.3 | 0.5 | 0.7 | 0.6 | 0.3 | 0.3 | 0.5 |
| 9.0 | 0.5 | 0.4 | 0.4 | 0.5 | 0.5 | 0.3 | 0.3 | 0.4 |
| 10.0 | 0.6 | 0.3 | 0.1 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 |
| 11.0 | 0.4 | 0.2 | 0.1 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 |
| 12.0 | 0.3 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 |
| 13.0 | -0.3 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 |
| 14.0 | -0.4 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 |
| 15.0 | -0.6 | -0.2 | -0.2 | 0.2 | -0.6 | -0.4 | -0.3 | -0.3 |
| 16.0 | -0.6 | -0.3 | -0.6 | -0.3 | -0.9 | -0.8 | -0.3 | -0.3 |
| 17.0 | -0.6 | -0.4 | -1.0 | -0.4 | -1.3 | -1.0 | -0.3 | -0.4 |
| 18.0 | -0.4 | -0.5 | -1.1 | -0.9 | -1.2 | -1.1 | -0.3 | -0.4 |
| 19.0 | -0.3 | -0.4 | -1.0 | -0.9 | -0.8 | -0.9 | 0.3 | -0.4 |
| 20.0 | -0.4 | 0.3 | -0.8 | 0.5 | -0.5 | -0.5 | 0.3 | -0.3 |
| 21.0 | -0.4 | 0.3 | 0.3 | 0.7 | 0.2 | 0.4 | 0.3 | -0.3 |
| 22.0 | 0.3 | 0.3 | 0.3 | 0.4 | 0.2 | 0.4 | 0.3 | -0.3 |
| 23.0 | 0.3 | 0.4 | 0.5 | 0.3 | 0.2 | 0.3 | 0.3 | 0.2 |
| 24.0 | 0.4 | 0.4 | 0.3 | 0.4 | 0.2 | 0.4 | 0.3 | 0.2 |

| Plan | Maximum Flood | | Maximum Ebb | | % Total Flow Downstream |
|---|---|---|---|---|---|
| | Time hr | Velocity fps | Time hr | Velocity fps | |
| Base | 3.0 | 0.9 | 15.0 | -0.6 | 31.6 |
| Plan 1 | 3.0 | 1.6 | 18.0 | -0.5 | 15.3 |
| Plan 2 | 2.0 | 1.0 | 18.0 | -1.1 | 36.6 |
| Plan 3 | 2.0 | 1.1 | 18.0 | -0.9 | 18.5 |
| Plan 4 | 1.0 | 1.1 | 17.0 | -1.3 | 36.0 |
| Plan 5 | 2.0 | 1.1 | 18.0 | -1.1 | 34.7 |
| Plan 6 | 1.0 | 0.7 | 17.0 | -0.3 | 12.8 |
| Plan 7 | 1.0 | 1.0 | 18.0 | -0.4 | 24.6 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 16

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 7, Bottom

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.9 | 0.4 | 0.7 |
| 1.0 | 0.7 | 0.7 | 1.0 | 1.0 | 1.0 | 0.9 | 0.7 | 1.1 |
| 2.0 | 0.9 | 1.1 | 1.2 | 1.1 | 1.2 | 1.4 | 1.2 | 0.8 |
| 3.0 | 0.9 | 1.3 | 1.3 | 1.4 | 1.3 | 1.4 | 1.1 | 0.9 |
| 4.0 | 0.7 | 1.3 | 1.4 | 1.6 | 1.3 | 1.4 | 1.2 | 0.9 |
| 5.0 | 0.7 | 1.6 | 1.6 | 1.6 | 1.4 | 1.6 | 1.4 | 0.8 |
| 6.0 | 0.9 | 1.7 | 1.6 | 1.7 | 1.5 | 1.5 | 1.6 | 0.9 |
| 7.0 | 0.7 | 1.7 | 1.5 | 1.6 | 1.6 | 1.5 | 1.5 | 0.8 |
| 8.0 | 0.8 | 1.6 | 1.4 | 1.7 | 1.5 | 1.3 | 1.2 | 0.7 |
| 9.0 | 0.8 | 1.5 | 1.4 | 1.5 | 1.5 | 1.3 | 1.2 | 0.7 |
| 10.0 | 0.5 | 1.2 | 1.3 | 1.3 | 1.4 | 1.1 | 1.2 | 0.9 |
| 11.0 | 0.6 | 1.0 | 1.0 | 1.1 | 1.0 | 0.9 | 1.0 | 0.7 |
| 12.0 | 0.4 | 0.7 | 0.7 | 0.8 | 0.8 | 0.9 | 0.6 | 0.5 |
| 13.0 | 0.3 | 0.5 | 0.3 | 0.5 | 0.3 | 0.5 | 0.3 | 0.3 |
| 14.0 | -0.3 | 0.2 | 0.1 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 |
| 15.0 | -0.3 | 0.2 | -0.5 | -0.4 | -0.2 | 0.2 | -0.3 | -0.3 |
| 16.0 | -0.3 | -0.8 | -0.9 | -0.9 | -0.2 | -0.6 | -0.3 | -0.3 |
| 17.0 | -0.8 | -1.0 | -0.9 | -0.9 | -0.3 | -0.8 | -0.3 | -0.3 |
| 18.0 | -0.7 | -1.0 | -1.0 | -0.9 | -0.4 | -0.6 | -0.3 | -0.3 |
| 19.0 | -0.6 | -0.9 | -0.9 | -0.7 | -0.4 | -0.5 | -0.3 | -0.3 |
| 20.0 | -0.6 | -0.5 | -0.8 | -0.5 | -0.3 | -0.4 | -0.3 | -0.3 |
| 21.0 | -0.4 | -0.4 | -0.5 | -0.4 | -0.2 | -0.3 | -0.3 | -0.3 |
| 22.0 | -0.3 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.3 | -0.3 |
| 23.0 | 0.3 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 |
| 24.0 | 0.3 | 0.3 | 0.3 | 0.5 | 0.3 | 0.5 | 0.3 | 0.4 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 2.0 | 0.9 | 17.0 | -0.8 | 29.4 |
| Plan 1 | 6.0 | 1.7 | 17.0 | -1.0 | 21.8 |
| Plan 2 | 5.0 | 1.6 | 18.0 | -1.0 | 25.5 |
| Plan 3 | 6.0 | 1.7 | 16.0 | -0.9 | 21.3 |
| Plan 4 | 7.0 | 1.6 | 18.0 | -0.4 | 11.2 |
| Plan 5 | 5.0 | 1.6 | 17.0 | -0.8 | 16.4 |
| Plan 6 | 6.0 | 1.6 | 15.0 | -0.3 | 12.8 |
| Plan 7 | 1.0 | 1.1 | 15.0 | -0.3 | 16.3 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 17

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 8, Surface

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | -0.9 | -1.3 | -1.5 | -1.7 | -1.2 | -1.3 | -1.0 | -0.8 |
| 1.0 | -0.3 | -0.8 | -0.5 | -1.1 | -0.6 | -0.6 | -0.3 | -0.2 |
| 2.0 | -0.3 | -0.3 | 0.1 | -0.2 | -0.4 | -0.2 | 0.3 | 0.2 |
| 3.0 | -0.3 | 0.3 | 0.1 | -0.2 | 0.2 | 0.4 | 0.3 | 0.5 |
| 4.0 | 0.3 | 0.7 | 0.4 | 0.3 | 0.2 | 0.4 | 0.3 | 0.8 |
| 5.0 | 0.3 | 0.8 | 0.6 | 0.5 | 0.4 | 0.5 | 0.3 | 1.0 |
| 6.0 | 0.3 | 0.7 | 0.6 | 0.3 | 0.4 | 0.3 | 0.4 | 0.7 |
| 7.0 | 0.3 | 0.5 | 0.6 | 0.3 | 0.4 | 0.5 | 0.5 | 0.8 |
| 8.0 | 0.3 | 0.6 | 0.4 | 0.6 | 0.3 | 0.5 | 0.4 | 0.7 |
| 9.0 | 0.3 | 0.5 | 0.5 | 0.6 | 0.2 | 0.5 | 0.4 | 0.5 |
| 10.0 | 0.3 | 0.5 | 0.4 | 0.5 | 0.2 | 0.5 | 0.4 | 0.2 |
| 11.0 | -0.3 | 0.5 | 0.4 | 0.3 | 0.3 | 0.5 | 0.4 | 0.2 |
| 12.0 | -0.5 | -0.2 | 0.1 | -0.2 | -0.2 | 0.2 | 0.4 | 0.2 |
| 13.0 | -0.3 | -0.2 | -0.3 | -0.4 | -0.6 | -0.4 | -0.4 | -0.2 |
| 14.0 | -0.8 | -0.3 | -1.0 | -1.0 | -1.3 | -1.0 | -0.8 | -0.5 |
| 15.0 | -1.1 | -1.1 | -1.7 | -1.7 | -1.7 | -1.5 | -1.4 | -0.8 |
| 16.0 | -1.5 | -1.8 | -2.0 | -2.1 | -1.7 | -2.1 | -1.8 | -0.7 |
| 17.0 | -1.7 | -2.1 | -2.1 | -2.2 | -1.8 | -2.1 | -2.1 | -0.9 |
| 18.0 | -1.8 | -2.3 | -2.2 | -2.3 | -1.9 | -2.1 | -2.1 | -1.3 |
| 19.0 | -2.1 | -2.4 | -2.4 | -2.6 | -2.2 | -2.4 | -2.2 | -1.5 |
| 20.0 | -2.1 | -2.4 | -2.5 | -2.6 | -2.1 | -2.4 | -2.4 | -1.4 |
| 21.0 | -2.4 | -2.6 | -2.5 | -2.7 | -2.1 | -2.4 | -2.3 | -1.5 |
| 22.0 | -2.3 | -2.4 | -2.4 | -2.6 | -2.3 | -2.3 | -2.4 | -0.9 |
| 23.0 | -2.0 | -2.1 | -2.4 | -2.6 | -2.1 | -2.2 | -2.3 | -1.4 |
| 24.0 | -1.7 | -2.0 | -2.1 | -2.4 | -1.8 | -1.9 | -1.7 | -1.4 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 8.0 | 0.3 | 21.0 | -2.4 | 91.5 |
| Plan 1 | 5.0 | 0.8 | 21.0 | -2.6 | 82.4 |
| Plan 2 | 5.0 | 0.6 | 21.0 | -2.5 | 85.4 |
| Plan 3 | 8.0 | 0.6 | 21.0 | -2.7 | 89.3 |
| Plan 4 | 5.0 | 0.4 | 22.0 | -2.3 | 90.5 |
| Plan 5 | 5.0 | 0.5 | 19.0 | -2.4 | 85.0 |
| Plan 6 | 7.0 | 0.5 | 20.0 | -2.4 | 85.4 |
| Plan 7 | 5.0 | 1.0 | 19.0 | -1.5 | 70.1 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 18

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 8, Bottom

| | Velocity, fps | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time hr* | Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
| 0.0 | 0.9 | 1.1 | 1.1 | 0.9 | 1.4 | 1.2 | 1.0 | 0.8 |
| 1.0 | 1.1 | 1.3 | 1.4 | 1.3 | 1.8 | 1.3 | 1.2 | 1.1 |
| 2.0 | 1.2 | 1.6 | 1.9 | 1.6 | 1.6 | 1.5 | 1.6 | 1.4 |
| 3.0 | 1.3 | 2.0 | 1.9 | 1.9 | 1.8 | 1.5 | 1.8 | 1.4 |
| 4.0 | 1.4 | 2.1 | 1.8 | 1.9 | 1.7 | 1.7 | 1.8 | 1.4 |
| 5.0 | 1.3 | 2.1 | 1.9 | 2.1 | 1.9 | 1.7 | 1.6 | 1.2 |
| 6.0 | 1.2 | 2.1 | 2.0 | 1.9 | 1.8 | 1.6 | 1.6 | 1.0 |
| 7.0 | 1.2 | 1.9 | 1.7 | 2.1 | 1.8 | 1.5 | 1.6 | 1.1 |
| 8.0 | 1.0 | 1.8 | 1.5 | 1.6 | 1.7 | 1.5 | 1.6 | 0.9 |
| 9.0 | 1.1 | 1.6 | 1.3 | 1.6 | 1.7 | 1.5 | 1.6 | 0.5 |
| 10.0 | 0.9 | 1.5 | 0.9 | 1.5 | 1.4 | 1.5 | 1.4 | 0.2 |
| 11.0 | 0.7 | 1.5 | 0.8 | 1.3 | 0.9 | 1.1 | 1.0 | 0.2 |
| 12.0 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.3 | 0.1 |
| 13.0 | 0.5 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.1 |
| 14.0 | -0.3 | -0.3 | -0.3 | -0.3 | 0.2 | -0.3 | 0.3 | 0.1 |
| 15.0 | -0.8 | -0.5 | -0.6 | -0.5 | -0.2 | -0.6 | -0.3 | -0.1 |
| 16.0 | -0.8 | -0.7 | -0.7 | -0.7 | -0.3 | -0.7 | -0.7 | -0.3 |
| 17.0 | -0.6 | -0.7 | -1.0 | -1.1 | -0.7 | -0.7 | -1.1 | -0.6 |
| 18.0 | -1.0 | -0.9 | -1.0 | -1.1 | -0.9 | -0.7 | -1.2 | -0.8 |
| 19.0 | -0.8 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -1.1 | -0.7 |
| 20.0 | -0.6 | -0.2 | -0.2 | -0.2 | -0.9 | -0.3 | -1.1 | -0.1 |
| 21.0 | -0.3 | -0.2 | -0.2 | 0.2 | -0.7 | 0.2 | -0.6 | -0.1 |
| 22.0 | -0.3 | 0.2 | 0.1 | 0.3 | -0.3 | 0.3 | 0.3 | -0.1 |
| 23.0 | 0.3 | 0.4 | 0.5 | 0.7 | 0.4 | 0.6 | 0.3 | -0.2 |
| 24.0 | 0.6 | 0.8 | 0.8 | 0.8 | 0.9 | 0.8 | 0.6 | 0.5 |

| | Maximum Flood | | Maximum Ebb | | |
|---|---|---|---|---|---|
| Plan | Time hr | Velocity fps | Time hr | Velocity fps | % Total Flow Downstream |
| Base | 4.0 | 1.4 | 18.0 | -1.0 | 26.5 |
| Plan 1 | 4.0 | 2.1 | 18.0 | -0.9 | 15.4 |
| Plan 2 | 6.0 | 2.0 | 17.0 | -1.0 | 18.7 |
| Plan 3 | 5.0 | 2.1 | 17.0 | -1.1 | 16.8 |
| Plan 4 | 5.0 | 1.9 | 18.0 | -0.9 | 17.6 |
| Plan 5 | 4.0 | 1.7 | 16.0 | -0.7 | 16.4 |
| Plan 6 | 3.0 | 1.8 | 18.0 | -1.2 | 23.2 |
| Plan 7 | 2.0 | 1.4 | 18.0 | -0.8 | 20.7 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 19

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 9, Surface

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | -0.8 | -0.1 | -0.3 | -0.7 | -0.3 | -0.1 | -0.6 | -0.3 |
| 1.0 | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.1 | -0.5 | -0.3 |
| 2.0 | 0.2 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.2 | 0.3 |
| 3.0 | 0.6 | 0.1 | 0.2 | 0.1 | 0.3 | 0.1 | 0.2 | 0.3 |
| 4.0 | 1.0 | 0.2 | 0.6 | 0.4 | 0.6 | 0.1 | 0.5 | 0.4 |
| 5.0 | 0.2 | 0.7 | 0.7 | 0.8 | 1.1 | 0.1 | 0.9 | 0.4 |
| 6.0 | 0.1 | 0.7 | 0.4 | 0.8 | 1.2 | 0.1 | 0.8 | 0.4 |
| 7.0 | 0.5 | 0.8 | 0.5 | 1.0 | 1.3 | 0.2 | 0.9 | 0.3 |
| 8.0 | 0.7 | 0.7 | 0.5 | 0.8 | 1.2 | 0.2 | 0.8 | 0.5 |
| 9.0 | 0.8 | 0.6 | 0.5 | 0.8 | 1.0 | 0.1 | 0.6 | 0.5 |
| 10.0 | 0.7 | 0.5 | 0.4 | 0.6 | 0.6 | 0.1 | 0.6 | 0.4 |
| 11.0 | 0.4 | 0.4 | 0.2 | 0.3 | 0.3 | 0.1 | 0.3 | 0.4 |
| 12.0 | 0.2 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.1 | -0.0 |
| 13.0 | -0.0 | 0.1 | -0.1 | 0.1 | -0.0 | 0.1 | -0.0 | -0.4 |
| 14.0 | -0.2 | -0.6 | -0.4 | -1.3 | -0.7 | -0.1 | -0.8 | -0.3 |
| 15.0 | -0.4 | -1.1 | -1.3 | -1.9 | -1.7 | -1.3 | -1.5 | -0.4 |
| 16.0 | -0.6 | -1.5 | -1.1 | -1.7 | -1.8 | -0.8 | -1.5 | -0.4 |
| 17.0 | -1.7 | -0.3 | -0.8 | -1.1 | -1.2 | -0.9 | -1.1 | -0.3 |
| 18.0 | -2.1 | -1.1 | -0.6 | -0.5 | -1.1 | -0.4 | -0.9 | -0.4 |
| 19.0 | -2.1 | -1.0 | -0.7 | -1.0 | -0.8 | -0.3 | -1.3 | -0.7 |
| 20.0 | -2.0 | -1.4 | -0.7 | -0.9 | -0.6 | -0.4 | -1.5 | -1.1 |
| 21.0 | 0.4 | -1.1 | -0.6 | -0.6 | -0.7 | -0.1 | -1.0 | -0.9 |
| 22.0 | -0.8 | -0.8 | -1.2 | -0.7 | -0.7 | -0.4 | -1.0 | -0.8 |
| 23.0 | -0.9 | -0.2 | -1.1 | -0.6 | -0.8 | -0.6 | -0.6 | -0.9 |
| 24.0 | -0.7 | -0.5 | -0.6 | -0.5 | -0.7 | -0.4 | -0.9 | -0.5 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 4.0 | 1.0 | 18.0 | -2.1 | 68.3 |
| Plan 1 | 7.0 | 0.8 | 16.0 | -1.5 | 66.9 |
| Plan 2 | 5.0 | 0.7 | 15.0 | -1.3 | 69.1 |
| Plan 3 | 7.0 | 1.0 | 15.0 | -1.9 | 66.4 |
| Plan 4 | 7.0 | 1.3 | 16.0 | -1.8 | 58.8 |
| Plan 5 | 7.0 | 0.2 | 15.0 | -1.3 | 77.9 |
| Plan 6 | 5.0 | 0.9 | 15.0 | -1.5 | 68.8 |
| Plan 7 | 8.0 | 0.5 | 20.0 | -1.1 | 66.6 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 20

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 9, Bottom

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.4 | 0.2 | 0.3 | 0.1 | 0.3 | 0.1 | 0.8 | 0.3 |
| 1.0 | 1.0 | 0.5 | 0.7 | 0.6 | 0.3 | 0.2 | 0.6 | 0.3 |
| 2.0 | 1.2 | 0.5 | 0.7 | 0.7 | 0.3 | 0.5 | 0.7 | 0.8 |
| 3.0 | 1.4 | 0.7 | 0.7 | 0.8 | 0.5 | 0.1 | 0.8 | 0.9 |
| 4.0 | 1.3 | 0.8 | 0.6 | 0.8 | 0.6 | 0.1 | 0.9 | 0.6 |
| 5.0 | 1.2 | 0.5 | 0.2 | 0.4 | 0.3 | 0.1 | 0.8 | 0.3 |
| 6.0 | 1.1 | 0.6 | 0.2 | 0.2 | 0.3 | 0.1 | 0.6 | 0.3 |
| 7.0 | 1.0 | 0.1 | 0.2 | 0.1 | 0.3 | 0.1 | 0.5 | 0.3 |
| 8.0 | 0.9 | 0.1 | 0.2 | 0.1 | 0.3 | 0.1 | 0.4 | 0.3 |
| 9.0 | 0.8 | 0.1 | 0.2 | 0.1 | 0.3 | 0.1 | 0.2 | 0.3 |
| 10.0 | 0.6 | 0.1 | 0.2 | 0.1 | -0.3 | 0.1 | 0.3 | 0.3 |
| 11.0 | 0.4 | 0.1 | 0.2 | 0.1 | -0.3 | 0.1 | 0.2 | 0.3 |
| 12.0 | 0.2 | -0.1 | 0.1 | 0.1 | -0.3 | 0.1 | 0.2 | 0.3 |
| 13.0 | 0.1 | -0.1 | 0.1 | -0.1 | -0.3 | -0.0 | -0.2 | -0.3 |
| 14.0 | -0.4 | -0.1 | -0.1 | -0.1 | -0.3 | -0.1 | -0.3 | -0.3 |
| 15.0 | -1.0 | -0.5 | -0.4 | -0.3 | -0.8 | -0.1 | -0.8 | -0.3 |
| 16.0 | -1.0 | -0.8 | -0.7 | -0.8 | -1.2 | -0.1 | -1.1 | -0.9 |
| 17.0 | -1.0 | -1.1 | -0.8 | -1.2 | -1.3 | -0.3 | -1.1 | -0.9 |
| 18.0 | -1.0 | -0.8 | -0.7 | -1.1 | -0.9 | -0.1 | -0.8 | -0.4 |
| 19.0 | -1.0 | -0.5 | -0.1 | -0.7 | -0.6 | -0.1 | -0.3 | -0.3 |
| 20.0 | -0.9 | -0.2 | 0.1 | -0.2 | -0.3 | 0.1 | -0.0 | 0.3 |
| 21.0 | -0.6 | -0.1 | 0.2 | -0.1 | 0.3 | 0.1 | 0.1 | 0.3 |
| 22.0 | -0.5 | -0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.2 | 0.3 |
| 23.0 | -0.2 | -0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.2 | 0.3 |
| 24.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.6 | 0.3 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 3.0 | 1.4 | 15.0 | -1.0 | 39.6 |
| Plan 1 | 4.0 | 0.8 | 17.0 | -1.1 | 51.7 |
| Plan 2 | 1.0 | 0.7 | 17.0 | -0.8 | 34.4 |
| Plan 3 | 3.0 | 0.8 | 17.0 | -1.2 | 49.2 |
| Plan 4 | 4.0 | 0.6 | 17.0 | -1.3 | 59.9 |
| Plan 5 | 2.0 | 0.5 | 17.0 | -0.3 | 26.3 |
| Plan 6 | 4.0 | 0.9 | 16.0 | -1.1 | 36.9 |
| Plan 7 | 3.0 | 0.9 | 16.0 | -0.9 | 34.9 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 21

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 10, Surface

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | -0.6 | 0.1 | -0.6 | -0.8 | -0.7 | -0.7 | -0.7 | -0.9 |
| 1.0 | 0.1 | 0.0 | -0.1 | -0.1 | -0.3 | -0.1 | 0.1 | -0.4 |
| 2.0 | 0.2 | 0.2 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.3 |
| 3.0 | 0.8 | 0.5 | 0.2 | 0.3 | 0.3 | 0.2 | 0.3 | 0.3 |
| 4.0 | 0.8 | 0.9 | 1.0 | 0.7 | 0.6 | 0.8 | 0.9 | 1.0 |
| 5.0 | 1.0 | 1.1 | 1.1 | 1.1 | 1.2 | 1.1 | 1.3 | 1.3 |
| 6.0 | 1.0 | 1.1 | 1.3 | 1.4 | 1.4 | 1.1 | 1.3 | 1.3 |
| 7.0 | 1.0 | 1.2 | 1.3 | 1.5 | 1.5 | 1.3 | 1.4 | 1.4 |
| 8.0 | 1.2 | 1.3 | 1.4 | 1.4 | 1.5 | 1.3 | 1.5 | 1.2 |
| 9.0 | 1.2 | 1.4 | 1.4 | 1.5 | 1.6 | 1.4 | 1.4 | 1.3 |
| 10.0 | 1.2 | 1.4 | 1.4 | 1.4 | 1.6 | 1.4 | 1.5 | 1.3 |
| 11.0 | 1.2 | 1.0 | 1.1 | 1.0 | 1.2 | 1.1 | 1.1 | 1.1 |
| 12.0 | 0.9 | 0.7 | 0.7 | 0.8 | 0.9 | 0.6 | 0.7 | 0.6 |
| 13.0 | 0.4 | 0.1 | 0.1 | 0.2 | 0.3 | 0.1 | -0.0 | 0.3 |
| 14.0 | -0.1 | -0.0 | -0.1 | -0.1 | -0.3 | -0.1 | -0.4 | -0.4 |
| 15.0 | -0.9 | -0.8 | -0.9 | -0.6 | -0.8 | -0.7 | -1.2 | -0.9 |
| 16.0 | -1.3 | -1.4 | -1.5 | -1.5 | -1.6 | -1.2 | -1.7 | -1.8 |
| 17.0 | -1.4 | -1.7 | -2.0 | -1.9 | -2.3 | -1.5 | -2.2 | -1.9 |
| 18.0 | -1.6 | -2.5 | -2.4 | -2.6 | -2.6 | -2.3 | -2.6 | -2.2 |
| 19.0 | -2.1 | -2.7 | -2.5 | -2.7 | -2.6 | -2.4 | -2.7 | -2.4 |
| 20.0 | -2.2 | -2.5 | -2.4 | -2.7 | -2.6 | -2.2 | -2.4 | -2.3 |
| 21.0 | -2.3 | -2.3 | -2.4 | -2.4 | -2.1 | -2.2 | -2.2 | -2.3 |
| 22.0 | -2.1 | -2.1 | -2.1 | -2.4 | -1.8 | -1.9 | -2.0 | -2.1 |
| 23.0 | -1.5 | -1.8 | -1.7 | -1.8 | -1.6 | -1.6 | -1.5 | -1.8 |
| 24.0 | -1.1 | -1.3 | -1.2 | -1.3 | -1.2 | -1.1 | -1.2 | -1.3 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 8.0 | 1.2 | 21.0 | -2.3 | 60.4 |
| Plan 1 | 10.0 | 1.4 | 19.0 | -2.7 | 63.9 |
| Plan 2 | 8.0 | 1.4 | 19.0 | -2.5 | 64.3 |
| Plan 3 | 7.0 | 1.5 | 19.0 | -2.7 | 64.2 |
| Plan 4 | 9.0 | 1.6 | 18.0 | -2.6 | 62.8 |
| Plan 5 | 9.0 | 1.4 | 19.0 | -2.4 | 62.9 |
| Plan 6 | 8.0 | 1.5 | 19.0 | -2.7 | 64.3 |
| Plan 7 | 7.0 | 1.4 | 19.0 | -2.4 | 64.2 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 22

Effects of Plans 1, 2, 3, 4, 5, 6, and 7

Station 10, Bottom

| Time hr* | Velocity, fps Base Test | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | -0.0 | 0.3 |
| 1.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | -0.0 | 0.3 |
| 2.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.1 | 0.3 |
| 3.0 | 0.3 | 0.2 | 0.4 | 0.3 | 0.3 | 0.1 | 0.6 | 0.3 |
| 4.0 | 0.7 | 0.9 | 0.5 | 0.8 | 0.4 | 0.4 | 0.6 | 0.3 |
| 5.0 | 0.6 | 0.9 | 0.7 | 0.8 | 0.4 | 0.8 | 0.7 | 0.8 |
| 6.0 | 0.5 | 1.1 | 0.4 | 0.8 | 0.3 | 0.6 | 0.4 | 0.9 |
| 7.0 | 0.3 | 0.7 | 0.4 | 0.7 | 0.3 | 0.1 | 0.4 | 0.9 |
| 8.0 | 0.4 | 0.2 | 0.2 | 0.1 | 0.3 | 0.1 | 0.2 | 0.7 |
| 9.0 | 0.4 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.3 | 0.6 |
| 10.0 | 0.2 | -0.1 | 0.1 | 0.1 | -0.3 | 0.1 | 0.2 | 0.3 |
| 11.0 | 0.1 | -0.1 | -0.1 | 0.1 | -0.3 | -0.1 | -0.2 | 0.3 |
| 12.0 | -0.1 | -0.1 | -0.1 | -0.1 | -0.3 | -0.1 | -0.2 | -0.3 |
| 13.0 | -0.4 | -0.4 | -0.5 | -0.7 | -0.4 | -0.5 | -0.7 | -0.3 |
| 14.0 | -0.8 | -0.8 | -0.5 | -0.7 | -0.4 | -0.7 | -0.8 | -0.8 |
| 15.0 | -0.6 | -0.7 | -0.5 | -0.8 | -0.3 | -0.8 | -0.6 | -0.9 |
| 16.0 | -0.8 | -0.9 | -0.5 | -0.8 | -0.4 | -1.0 | -0.7 | -1.0 |
| 17.0 | -0.8 | -1.0 | -0.5 | -0.8 | -0.3 | -0.8 | -0.5 | -1.0 |
| 18.0 | -0.3 | -0.8 | -0.2 | -0.4 | 0.0 | -0.5 | -0.3 | -0.9 |
| 19.0 | -0.1 | -0.1 | -0.0 | 0.1 | 0.2 | -0.2 | -0.0 | -0.6 |
| 20.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | -0.0 | 0.1 | 0.3 |
| 21.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.2 | 0.3 |
| 22.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.2 | 0.3 |
| 23.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.3 |
| 24.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.3 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 4.0 | 0.7 | 14.0 | -0.8 | 46.6 |
| Plan 1 | 6.0 | 1.1 | 17.0 | -1.0 | 50.7 |
| Plan 2 | 5.0 | 0.7 | 14.0 | -0.5 | 44.5 |
| Plan 3 | 5.0 | 0.8 | 17.0 | -0.8 | 45.5 |
| Plan 4 | 4.0 | 0.4 | 13.0 | -0.4 | 37.3 |
| Plan 5 | 5.0 | 0.8 | 16.0 | -1.0 | 59.3 |
| Plan 6 | 5.0 | 0.7 | 14.0 | -0.8 | 49.4 |
| Plan 7 | 6.0 | 0.9 | 16.0 | -1.0 | 43.9 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 23

Maximum Salinities (Total Salts, ppt) for Navigation Channel and Bay Stations

Total Freshwater Inflow = 15,500 cfs

| Station No. | Depth | Base | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Channel Stations | | | | | |
| 1 | Surface | 30.4 | 29.8 | 30.4 | 29.4 | 29.9 | 29.9 | 29.5 | 30.7 |
| | Bottom | 30.2 | 29.9 | 30.7 | 29.5 | 30.0 | 30.4 | 29.6 | 30.7 |
| 2 | Surface | 29.2 | 29.1 | 29.7 | 28.7 | 29.1 | 29.6 | 28.9 | 29.0 |
| | Bottom | 29.8 | 29.5 | 30.1 | 29.1 | 29.3 | 29.7 | 29.2 | 30.3 |
| 3 | Surface | 28.9 | 28.9 | 29.3 | 28.6 | 28.9 | 29.4 | 28.6 | 28.9 |
| | Bottom | 28.9 | 29.0 | 30.1 | 28.8 | 29.0 | 29.4 | 28.7 | 30.0 |
| 4 | Surface | 26.8 | 26.4 | 22.3 | 25.2 | 26.3 | 26.6 | 25.6 | 21.9 |
| | Bottom | 28.8 | 29.3 | 29.6 | 28.5 | 29.3 | 29.1 | 28.7 | 28.8 |
| 5 | Surface | 26.5 | 20.9 | 22.0 | 23.0 | 22.7 | 23.1 | 22.2 | 23.9 |
| | Bottom | 28.3 | 28.6 | 29.4 | 28.1 | 28.3 | 29.0 | 28.5 | 28.4 |
| 6 | Surface | 22.6 | 20.4 | 17.4 | 14.8 | 16.7 | 20.4 | 17.4 | 18.6 |
| | Bottom | 27.6 | 28.4 | 29.3 | 27.9 | 28.3 | 28.8 | 28.2 | 28.1 |
| 7 | Surface | 21.3 | 14.7 | 18.1 | 16.3 | 23.2 | 19.9 | 18.7 | 21.6 |
| | Bottom | 27.0 | 28.2 | 29.1 | 27.5 | 28.0 | 28.8 | 27.9 | 27.8 |
| 8 | Surface | 22.0 | 19.2 | 18.7 | 16.9 | 18.1 | 18.4 | 17.3 | 21.2 |
| | Bottom | 26.5 | 28.0 | 27.7 | 28.5 | 27.7 | 28.2 | 27.4 | 26.4 |
| 9 | Surface | 15.5 | 15.3 | 11.4 | 12.9 | 15.1 | 14.5 | 12.8 | 16.0 |
| | Bottom | 25.6 | 26.8 | 26.8 | 27.7 | 27.4 | 27.6 | 27.8 | 24.7 |
| 10 | Surface | 12.3 | 14.5 | 14.8 | 11.7 | 14.3 | 16.2 | 14.5 | 16.5 |
| | Bottom | 23.8 | 24.7 | 26.2 | 27.1 | 26.1 | 26.9 | 28.7 | 23.3 |
| 11 | Surface | 8.7 | 12.1 | 9.6 | 12.0 | 10.4 | 10.4 | 14.0 | 14.1 |
| | Bottom | 21.9 | 24.7 | 23.7 | 25.3 | 22.4 | 24.6 | 24.0 | 22.0 |
| 12 | Surface | 6.3 | 4.6 | 9.5 | 5.2 | 6.9 | 6.0 | 4.9 | 6.3 |
| | Bottom | 16.6 | 19.2 | 19.1 | 18.6 | 16.3 | 17.8 | 15.6 | 16.9 |
| 13 | Surface | 1.0 | 1.3 | 2.0 | 1.4 | 1.2 | 2.5 | 1.0 | 1.4 |
| | Bottom | 10.1 | 2.9 | 10.7 | 3.3 | 2.7 | 9.0 | 3.0 | 9.2 |
| 14 | Surface | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Bottom | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | | | | Cedar Point Stations | | | | | |
| S4 | Surface | 26.1 | 30.3 | 30.2 | 31.0 | 29.6 | 31.1 | 28.9 | 28.8 |
| | Bottom | 28.1 | 30.3 | 30.2 | 31.0 | 29.7 | 31.0 | 29.1 | 28.9 |
| S7 | Surface | 27.3 | 30.3 | 30.3 | 30.8 | 29.6 | 31.1 | 29.1 | 29.2 |
| | Bottom | 27.6 | 30.4 | 30.2 | 30.9 | 29.8 | 31.0 | 29.2 | 29.3 |
| S10 | Surface | 28.3 | 30.4 | 30.2 | 30.8 | 29.6 | 30.9 | 29.2 | 29.7 |
| | Bottom | 28.6 | 30.5 | 30.2 | 31.0 | 29.6 | 30.9 | 29.1 | 30.3 |
| S12 | Surface | 28.5 | 27.3 | 29.7 | 29.5 | 29.6 | 29.8 | 29.1 | 30.3 |
| | Bottom | 28.6 | 30.4 | 30.2 | 30.5 | 29.7 | 30.8 | 29.2 | 30.9 |
| S14 | Surface | 28.5 | 26.7 | 28.7 | 27.4 | 27.6 | 27.7 | 26.5 | 27.7 |
| | Bottom | 28.3 | 29.3 | 30.0 | 29.9 | 29.2 | 30.4 | 29.2 | 29.5 |
| | | | | Bay Stations | | | | | |
| M1 | Surface | 13.7 | 16.1 | 12.5 | 13.3 | 13.7 | 10.4 | 11.2 | 14.6 |
| | Bottom | 14.6 | 18.1 | 15.3 | 15.6 | 15.7 | 15.6 | 16.0 | 16.1 |
| M2 | Surface | 17.4 | 21.7 | 18.6 | 18.1 | 18.1 | 19.1 | 19.5 | 19.8 |
| | Bottom | 18.4 | 23.9 | 18.8 | 18.1 | 18.2 | 19.1 | 19.3 | 20.4 |
| M3 | Surface | 18.1 | 18.9 | 18.1 | 18.5 | 18.4 | 18.4 | 17.4 | 19.7 |
| | Bottom | 20.0 | 19.7 | 18.2 | 18.5 | 18.6 | 18.8 | 17.6 | 19.6 |
| M4 | Surface | 28.0 | 28.5 | 26.8 | 28.2 | 28.8 | 27.9 | 28.5 | 27.0 |
| | Bottom | 28.0 | 28.5 | 27.0 | 28.1 | 28.6 | 28.0 | 28.6 | 27.2 |
| M5 | Surface | 28.1 | 26.2 | 23.0 | 25.4 | 26.8 | 26.3 | 26.3 | 25.6 |
| | Bottom | 28.8 | 27.7 | 23.8 | 27.0 | 27.3 | 26.9 | 27.1 | 26.4 |
| M6 | Surface | 13.4 | 19.5 | 16.9 | 17.0 | 18.1 | 16.7 | 15.1 | 18.6 |
| | Bottom | 16.7 | 23.1 | 21.3 | 20.6 | 20.4 | 20.4 | 14.9 | 21.1 |

(Continued)

Table 23 (Concluded)

| Station No. | Depth | Base | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Bay Stations (Continued) | | | | | |
| M7 | Surface | 15.0 | 18.1 | 15.6 | 16.6 | 17.1 | 16.8 | 16.0 | 18.7 |
| | Bottom | 16.7 | 19.3 | 16.7 | 17.3 | 17.6 | 18.2 | 17.4 | 19.2 |
| M8 | Surface | 15.2 | 17.1 | 14.9 | 15.7 | 15.4 | 15.0 | 17.3 | 16.8 |
| | Bottom | 16.9 | 17.1 | 15.0 | 15.8 | 15.5 | 15.0 | 19.8 | 16.8 |
| M9 | Surface | 23.3 | 23.0 | 23.9 | 20.3 | 22.0 | 21.3 | 20.9 | 20.0 |
| | Bottom | 24.5 | 23.0 | 23.9 | 20.5 | 22.1 | 21.5 | 20.8 | 20.1 |
| M10 | Surface | 23.4 | 23.7 | 23.9 | 23.0 | 21.1 | 20.2 | 20.8 | 19.0 |
| | Bottom | 25.2 | 24.0 | 23.9 | 23.1 | 21.8 | 22.5 | 21.3 | 20.7 |
| M11 | Surface | 19.2 | 19.7 | 20.2 | 20.8 | 20.2 | 20.8 | 19.5 | 21.7 |
| | Bottom | 24.1 | 20.4 | 21.4 | 21.9 | 21.3 | 22.2 | 21.7 | 23.3 |
| M12 | Surface | 21.9 | 18.8 | 19.5 | 20.0 | 20.0 | 18.8 | 17.9 | 20.7 |
| | Bottom | 22.0 | 19.3 | 19.7 | 21.4 | 22.0 | 20.7 | 20.4 | 21.8 |
| M13 | Surface | 25.0 | 24.9 | 22.5 | 25.7 | 24.9 | 24.1 | 24.1 | 25.2 |
| | Bottom | 27.5 | 26.9 | 23.5 | 27.1 | 26.7 | 25.6 | 25.3 | 25.3 |
| M14 | Surface | 24.3 | 22.1 | 21.6 | 22.0 | 22.7 | 22.9 | 22.4 | 22.2 |
| | Bottom | 25.6 | 22.6 | 21.6 | 23.8 | 22.7 | 23.2 | 23.1 | 23.4 |
| M15 | Surface | 25.2 | 24.2 | 25.1 | 24.8 | 23.9 | 23.4 | 23.6 | 27.0 |
| | Bottom | 26.5 | 25.3 | 25.4 | 25.4 | 25.3 | 24.6 | 24.0 | 27.3 |
| M16 | Surface | 27.1 | 29.0 | 25.3 | 28.3 | 28.4 | 29.2 | 28.6 | 27.0 |
| | Bottom | 29.0 | 29.0 | 28.3 | 28.3 | 28.6 | 29.2 | 28.8 | 27.5 |
| M17 | Surface | 28.4 | -- | 25.3 | -- | -- | -- | -- | 27.9 |
| | Bottom | 29.0 | -- | 26.3 | -- | -- | -- | -- | 28.0 |
| M18 | Surface | 26.6 | 25.3 | 23.9 | 24.4 | 24.9 | 25.7 | 24.6 | 26.1 |
| | Bottom | 28.2 | 26.6 | 24.9 | 25.8 | 26.5 | 26.6 | 27.0 | 27.2 |
| M19 | Surface | 28.5 | 25.4 | 26.4 | 27.9 | 26.7 | 27.3 | 27.0 | 28.6 |
| | Bottom | 28.6 | 28.7 | 28.3 | 29.2 | 28.8 | 29.0 | 28.2 | 28.8 |
| M20 | Surface | 29.5 | 29.1 | 28.3 | 28.5 | 29.3 | 30.1 | 28.6 | 24.5 |
| | Bottom | 29.6 | 29.3 | 28.6 | 29.4 | 29.3 | 29.8 | 28.9 | 28.3 |
| M21 | Surface | 30.1 | 30.1 | 29.5 | 29.2 | 29.7 | 30.8 | 29.3 | 29.8 |
| | Bottom | 30.3 | 30.1 | 30.0 | 29.5 | 30.2 | 30.9 | 29.8 | 29.6 |
| M22 | Surface | 28.6 | 28.6 | 25.4 | 27.4 | 27.8 | 27.8 | 27.7 | 27.9 |
| | Bottom | 28.8 | 28.9 | 25.4 | 28.0 | 28.5 | 28.8 | 27.9 | 28.3 |
| M23 | Surface | 28.4 | 26.9 | 26.6 | 25.4 | 26.1 | 26.9 | 25.3 | 27.2 |
| | Bottom | 30.5 | 29.7 | 29.5 | 30.5 | 31.3 | 30.3 | 30.4 | 30.5 |
| M24 | Surface | 15.8 | 19.3 | 18.8 | 18.2 | 18.9 | 20.3 | 18.5 | 20.3 |
| | Bottom | 26.1 | 21.1 | 18.9 | 19.0 | 19.0 | 20.5 | 18.4 | 20.7 |
| M25 | Surface | 26.8 | 25.7 | 25.4 | 24.4 | 25.2 | 25.7 | 24.4 | 24.5 |
| | Bottom | 28.4 | 26.2 | 25.7 | 25.0 | 26.7 | 27.9 | 25.7 | 24.9 |
| M26 | Surface | 30.3 | 29.1 | 28.7 | 28.3 | 29.0 | 29.5 | 28.3 | 28.0 |
| | Bottom | 30.0 | 28.9 | 28.6 | 28.4 | 29.2 | 29.8 | 28.6 | 28.4 |
| M27 | Surface | 27.5 | 26.5 | 24.9 | 24.6 | 25.8 | 26.7 | 25.3 | 26.5 |
| | Bottom | 28.0 | 27.4 | 25.7 | 25.6 | 26.0 | 26.9 | 25.9 | 28.1 |

Table 24

Average Salinities (Total Salts, ppt) for Navigation Channel and Bay Stations

Total Freshwater Inflow = 15,500 cfs

| Station No. | Depth | Base | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Channel Stations | | | | | |
| 1 | Surface | 28.9 | 27.6 | 27.4 | 27.1 | 28.0 | 27.9 | 28.1 | 28.5 |
| | Bottom | 29.8 | 29.5 | 30.1 | 29.1 | 29.6 | 29.7 | 29.3 | 30.3 |
| 2 | Surface | 27.6 | 26.1 | 27.0 | 26.0 | 26.4 | 27.2 | 26.4 | 26.3 |
| | Bottom | 29.3 | 28.7 | 29.9 | 28.8 | 29.1 | 29.4 | 28.9 | 30.0 |
| 3 | Surface | 25.4 | 24.5 | 23.8 | 24.2 | 24.9 | 25.5 | 24.6 | 24.2 |
| | Bottom | 28.7 | 28.8 | 29.5 | 28.6 | 28.8 | 29.2 | 28.5 | 28.9 |
| 4 | Surface | 25.1 | 20.2 | 20.1 | 20.6 | 19.5 | 21.2 | 19.9 | 20.1 |
| | Bottom | 28.5 | 29.0 | 29.4 | 28.2 | 28.5 | 28.9 | 28.4 | 28.6 |
| 5 | Surface | 21.8 | 17.0 | 18.7 | 18.4 | 17.9 | 19.8 | 18.6 | 20.4 |
| | Bottom | 28.1 | 28.4 | 29.3 | 27.9 | 28.1 | 28.8 | 28.3 | 28.3 |
| 6 | Surface | 18.2 | 14.0 | 13.3 | 12.8 | 15.1 | 14.9 | 15.0 | 15.2 |
| | Bottom | 27.2 | 28.3 | 29.3 | 27.7 | 28.1 | 28.7 | 28.0 | 28.0 |
| 7 | Surface | 17.8 | 11.5 | 12.7 | 17.7 | 16.9 | 15.6 | 14.7 | 17.1 |
| | Bottom | 26.7 | 27.8 | 28.9 | 27.4 | 28.0 | 28.5 | 27.7 | 27.3 |
| 8 | Surface | 15.8 | 14.1 | 13.5 | 12.8 | 16.5 | 14.8 | 13.8 | 17.2 |
| | Bottom | 26.1 | 27.6 | 27.3 | 28.1 | 27.5 | 28.0 | 27.2 | 25.8 |
| 9 | Surface | 9.0 | 10.3 | 8.1 | 9.1 | 10.3 | 10.0 | 9.9 | 9.8 |
| | Bottom | 24.7 | 26.2 | 26.6 | 27.4 | 26.7 | 27.3 | 27.2 | 24.4 |
| 10 | Surface | 6.4 | 6.6 | 7.2 | 5.5 | 6.9 | 7.4 | 6.3 | 10.0 |
| | Bottom | 23.5 | 23.8 | 25.3 | 26.7 | 25.0 | 26.4 | 26.7 | 22.6 |
| 11 | Surface | 4.5 | 5.3 | 4.5 | 4.9 | 4.5 | 5.1 | 5.2 | 6.3 |
| | Bottom | 18.9 | 17.6 | 19.2 | 17.4 | 14.9 | 18.9 | 17.3 | 17.8 |
| 12 | Surface | 2.2 | 1.7 | 2.9 | 1.9 | 2.2 | 2.4 | 1.5 | 1.9 |
| | Bottom | 9.6 | 8.2 | 10.1 | 8.1 | 8.2 | 9.5 | 7.5 | 9.5 |
| 13 | Surface | 0.3 | 0.3 | 0.5 | 0.3 | 0.3 | 0.5 | 0.3 | 0.3 |
| | Bottom | 3.2 | 0.7 | 2.9 | 0.7 | 0.6 | 2.2 | 0.7 | 2.8 |
| 14 | Surface | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Bottom | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | | | | Cedar Point Stations | | | | | |
| S4 | Surface | 24.4 | 25.6 | 26.6 | 26.3 | 25.2 | 26.4 | 24.1 | 24.6 |
| | Bottom | 26.8 | 26.1 | 27.4 | 26.9 | 25.9 | 26.8 | 25.1 | 25.3 |
| S7 | Surface | 24.7 | 25.9 | 26.6 | 25.9 | 25.6 | 26.0 | 24.5 | 24.3 |
| | Bottom | 25.7 | 26.5 | 27.3 | 26.6 | 26.2 | 27.0 | 25.4 | 25.2 |
| S10 | Surface | 26.3 | 26.4 | 27.1 | 26.6 | 26.2 | 26.8 | 25.3 | 25.7 |
| | Bottom | 27.4 | 28.8 | 28.5 | 28.8 | 28.0 | 28.9 | 27.2 | 27.8 |
| S12 | Surface | 26.8 | 25.4 | 27.5 | 26.6 | 26.6 | 26.6 | 24.9 | 26.6 |
| | Bottom | 28.2 | 28.9 | 28.9 | 28.5 | 28.7 | 29.4 | 28.0 | 29.9 |
| S14 | Surface | 27.1 | 25.3 | 26.8 | 26.0 | 26.1 | 26.5 | 24.6 | 25.1 |
| | Bottom | 27.7 | 26.5 | 27.5 | 27.2 | 27.1 | 27.5 | 26.1 | 26.3 |
| | | | | Bay Stations | | | | | |
| M1 | Surface | 9.4 | 10.3 | 7.6 | 9.0 | 8.0 | 6.8 | 8.2 | 9.9 |
| | Bottom | 13.2 | 17.0 | 12.8 | 13.9 | 14.4 | 12.9 | 15.2 | 14.4 |
| M2 | Surface | 14.4 | 19.4 | 16.7 | 16.1 | 16.9 | 17.2 | 16.7 | 17.2 |
| | Bottom | 17.7 | 20.8 | 18.2 | 17.5 | 17.6 | 18.3 | 17.6 | 19.0 |
| M3 | Surface | 14.0 | 16.4 | 15.0 | 15.5 | 15.1 | 14.6 | 15.1 | 14.7 |
| | Bottom | 18.8 | 18.1 | 16.5 | 17.0 | 16.6 | 16.5 | 15.9 | 18.0 |
| M4 | Surface | 24.4 | 22.1 | 24.7 | 24.0 | 23.9 | 22.8 | 23.4 | 22.3 |
| | Bottom | 26.0 | 25.0 | 25.2 | 25.1 | 25.4 | 24.0 | 25.0 | 24.4 |
| M5 | Surface | 24.6 | 23.9 | 22.2 | 23.3 | 25.0 | 24.5 | 23.8 | 23.0 |
| | Bottom | 27.3 | 25.1 | 23.0 | 23.5 | 25.7 | 25.1 | 24.7 | 24.5 |
| M6 | Surface | 10.8 | 15.3 | 14.2 | 13.3 | 15.7 | 13.0 | 14.1 | 13.8 |
| | Bottom | 15.8 | 21.2 | 19.2 | 17.9 | 19.0 | 18.7 | 14.5 | 20.1 |

(Continued)

Table 24 (Concluded)

| Station No. | Depth | Base | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Bay Stations (Continued) | | | | | |
| M7 | Surface | 12.8 | 16.5 | 14.3 | 14.5 | 14.6 | 14.5 | 14.3 | 15.8 |
| | Bottom | 15.7 | 17.6 | 15.7 | 16.2 | 15.8 | 15.8 | 15.6 | 17.1 |
| M8 | Surface | 13.4 | 16.5 | 13.7 | 15.0 | 14.7 | 13.6 | 13.9 | 15.7 |
| | Bottom | 15.2 | 16.8 | 14.4 | 15.3 | 15.1 | 14.2 | 18.2 | 16.0 |
| M9 | Surface | 18.8 | 20.8 | 20.7 | 18.1 | 19.6 | 19.5 | 18.6 | 19.1 |
| | Bottom | 22.0 | 22.3 | 21.5 | 19.6 | 20.1 | 19.7 | 18.8 | 19.4 |
| M10 | Surface | 18.1 | 20.5 | 19.5 | 18.2 | 18.6 | 19.0 | 18.3 | 18.5 |
| | Bottom | 23.4 | 22.9 | 21.7 | 20.9 | 20.3 | 20.5 | 19.6 | 19.9 |
| M11 | Surface | 16.4 | 18.3 | 17.7 | 18.6 | 18.3 | 18.1 | 17.5 | 19.8 |
| | Bottom | 21.6 | 19.1 | 18.8 | 19.8 | 19.3 | 19.3 | 18.3 | 21.2 |
| M12 | Surface | 17.4 | 16.2 | 15.0 | 16.9 | 16.0 | 15.1 | 15.5 | 15.7 |
| | Bottom | 19.1 | 18.0 | 17.5 | 19.3 | 19.6 | 17.7 | 18.6 | 20.3 |
| M13 | Surface | 20.3 | 20.2 | 19.5 | 21.2 | 20.6 | 19.9 | 19.5 | 21.3 |
| | Bottom | 24.7 | 22.5 | 20.9 | 24.0 | 23.3 | 22.4 | 21.8 | 22.7 |
| M14 | Surface | 20.2 | 18.7 | 18.0 | 18.9 | 18.7 | 18.6 | 18.3 | 19.2 |
| | Bottom | 24.3 | 21.1 | 20.6 | 22.7 | 21.9 | 21.9 | 21.9 | 22.6 |
| M15 | Surface | 22.1 | 22.3 | 24.2 | 23.2 | 22.4 | 21.5 | 21.8 | 25.5 |
| | Bottom | 24.9 | 23.0 | 24.6 | 23.6 | 23.4 | 22.3 | 22.9 | 26.2 |
| M16 | Surface | 22.7 | 23.1 | 22.8 | 23.7 | 23.3 | 23.6 | 23.3 | 22.3 |
| | Bottom | 26.0 | 27.0 | 25.4 | 25.7 | 25.2 | 25.8 | 25.7 | 25.0 |
| M17 | Surface | 24.0 | -- | 23.0 | -- | -- | -- | -- | 24.6 |
| | Bottom | 27.2 | -- | 24.7 | -- | -- | -- | -- | 26.7 |
| M18 | Surface | 22.7 | 22.1 | 21.5 | 21.3 | 23.0 | 23.8 | 22.4 | 22.2 |
| | Bottom | 27.4 | 26.1 | 24.1 | 24.3 | 25.5 | 26.0 | 25.3 | 26.0 |
| M19 | Surface | 25.1 | 23.6 | 24.5 | 24.7 | 24.2 | 24.0 | 23.5 | 23.6 |
| | Bottom | 27.5 | 27.0 | 27.6 | 28.2 | 27.9 | 27.9 | 27.0 | 27.2 |
| M20 | Surface | 26.2 | 23.8 | 24.6 | 24.9 | 24.6 | 24.7 | 24.9 | 22.3 |
| | Bottom | 28.1 | 27.4 | 27.4 | 27.4 | 27.5 | 27.9 | 27.4 | 27.3 |
| M21 | Surface | 28.2 | 27.0 | 25.6 | 25.7 | 26.6 | 27.6 | 26.1 | 27.2 |
| | Bottom | 29.3 | 28.8 | 27.7 | 28.0 | 28.4 | 28.9 | 28.0 | 28.5 |
| M22 | Surface | 27.7 | 26.8 | 24.7 | 25.2 | 25.8 | 26.5 | 25.2 | 26.2 |
| | Bottom | 28.4 | 27.4 | 25.2 | 26.6 | 27.3 | 28.0 | 26.0 | 27.3 |
| M23 | Surface | 27.9 | 26.5 | 25.1 | 24.9 | 25.7 | 26.6 | 24.9 | 26.2 |
| | Bottom | 30.3 | 29.3 | 29.0 | 29.9 | 30.4 | 30.0 | 29.7 | 30.1 |
| M24 | Surface | 14.4 | 18.3 | 17.2 | 17.2 | 17.6 | 18.3 | 17.0 | 19.2 |
| | Bottom | 20.8 | 19.0 | 17.4 | 17.5 | 17.7 | 18.5 | 17.1 | 19.5 |
| M25 | Surface | 22.5 | 23.3 | 24.3 | 22.3 | 22.1 | 22.9 | 22.0 | 22.4 |
| | Bottom | 25.3 | 23.8 | 24.6 | 22.7 | 22.9 | 23.7 | 22.6 | 23.1 |
| M26 | Surface | 27.9 | 25.5 | 24.5 | 24.3 | 25.8 | 26.4 | 24.6 | 24.4 |
| | Bottom | 28.5 | 26.3 | 25.4 | 25.3 | 26.6 | 27.0 | 25.7 | 25.7 |
| M27 | Surface | 26.6 | 25.7 | 24.5 | 23.6 | 24.9 | 26.1 | 24.5 | 25.8 |
| | Bottom | 27.7 | 26.8 | 25.1 | 24.7 | 25.7 | 26.5 | 25.3 | 27.4 |

Table 25

Minimum Salinities (Total Salts, ppt) for Navigation Channel and Bay Stations

Total Freshwater Inflow = 15,500 cfs

| Station No. | Depth | Base | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Channel Stations | | | | | |
| 1 | Surface | 25.3 | 24.3 | 23.3 | 22.9 | 25.9 | 25.1 | 26.2 | 23.9 |
| | Bottom | 29.5 | 28.8 | 29.1 | 28.5 | 29.1 | 29.0 | 28.6 | 29.3 |
| 2 | Surface | 25.6 | 20.6 | 23.0 | 20.5 | 21.7 | 23.1 | 22.1 | 22.3 |
| | Bottom | 28.9 | 25.9 | 29.8 | 27.0 | 28.8 | 29.1 | 28.8 | 29.6 |
| 3 | Surface | 17.7 | 19.2 | 17.8 | 19.1 | 19.5 | 20.4 | 18.5 | 20.8 |
| | Bottom | 28.3 | 28.7 | 29.3 | 28.3 | 28.5 | 28.9 | 28.3 | 27.5 |
| 4 | Surface | 23.3 | 15.8 | 16.5 | 17.1 | 15.6 | 17.7 | 16.8 | 17.1 |
| | Bottom | 28.1 | 28.5 | 29.2 | 27.9 | 28.2 | 28.6 | 28.1 | 28.4 |
| 5 | Surface | 17.6 | 14.5 | 16.9 | 14.6 | 15.3 | 17.8 | 15.7 | 17.4 |
| | Bottom | 27.7 | 28.0 | 28.9 | 27.5 | 27.8 | 28.6 | 28.2 | 27.8 |
| 6 | Surface | 12.1 | 9.1 | 8.0 | 10.2 | 12.0 | 11.0 | 12.1 | 9.0 |
| | Bottom | 26.8 | 28.1 | 29.2 | 27.3 | 27.9 | 28.6 | 27.7 | 27.9 |
| 7 | Surface | 9.0 | 7.8 | 7.7 | 7.7 | 10.6 | 13.4 | 11.1 | 8.0 |
| | Bottom | 26.5 | 27.3 | 28.4 | 27.3 | 27.7 | 28.2 | 27.6 | 26.6 |
| 8 | Surface | 8.3 | 8.6 | 8.8 | 9.1 | 14.2 | 10.4 | 8.4 | 10.7 |
| | Bottom | 24.5 | 26.0 | 26.9 | 27.7 | 27.3 | 27.8 | 26.8 | 24.8 |
| 9 | Surface | 3.9 | 5.3 | 4.6 | 4.6 | 5.1 | 5.0 | 5.2 | 4.5 |
| | Bottom | 23.8 | 24.9 | 26.0 | 26.5 | 24.5 | 26.4 | 26.5 | 23.9 |
| 10 | Surface | 3.4 | 2.8 | 3.4 | 2.8 | 3.3 | 3.8 | 2.7 | 3.5 |
| | Bottom | 22.9 | 22.2 | 23.7 | 25.6 | 22.9 | 25.0 | 26.2 | 21.3 |
| 11 | Surface | 1.7 | 2.1 | 1.7 | 1.7 | 1.6 | 1.8 | 1.6 | 2.3 |
| | Bottom | 15.3 | 7.2 | 14.7 | 8.9 | 8.2 | 14.2 | 10.5 | 13.8 |
| 12 | Surface | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 |
| | Bottom | 2.0 | 0.4 | 1.8 | 0.5 | 1.6 | 2.6 | 1.6 | 2.1 |
| 13 | Surface | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Bottom | 0.3 | 0.1 | 0.3 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 14 | Surface | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Bottom | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | | | | Cedar Point Stations | | | | | |
| S4 | Surface | 21.7 | 22.9 | 24.1 | 23.3 | 22.6 | 22.8 | 19.7 | 21.7 |
| | Bottom | 25.3 | 23.6 | 25.5 | 24.4 | 22.9 | 23.3 | 22.3 | 22.9 |
| S7 | Surface | 20.7 | 23.9 | 23.8 | 23.0 | 22.3 | 22.0 | 21.3 | 21.3 |
| | Bottom | 23.0 | 24.3 | 25.1 | 23.9 | 22.8 | 22.3 | 21.7 | 22.6 |
| S10 | Surface | 24.0 | 23.0 | 24.3 | 24.0 | 23.9 | 24.0 | 21.2 | 22.1 |
| | Bottom | 25.8 | 26.1 | 26.7 | 26.5 | [illegible]5.9 | 26.2 | 24.0 | 25.4 |
| S12 | Surface | 24.5 | 22.5 | 24.0 | 23.7 | 23.3 | 24.0 | 21.7 | 22.7 |
| | Bottom | 27.5 | 26.7 | 27.8 | 25.9 | 27.5 | 27.2 | 26.9 | 28.6 |
| S14 | Surface | 24.5 | 22.1 | 24.2 | 23.6 | 23.3 | 24.0 | 22.4 | 22.1 |
| | Bottom | 26.9 | 22.2 | 24.8 | 24.3 | 23.9 | 24.6 | 23.4 | 23.2 |
| | | | | Bay Stations | | | | | |
| M1 | Surface | 6.3 | 7.8 | 4.1 | 5.3 | 4.3 | 4.3 | 4.8 | 4.6 |
| | Bottom | 10.6 | 15.3 | 8.8 | 12.7 | 13.2 | 8.3 | 14.2 | 10.9 |
| M2 | Surface | 12.1 | 16.2 | 14.2 | 14.0 | 15.6 | 14.2 | 15.1 | 14.2 |
| | Bottom | 16.9 | 19.7 | 16.7 | 16.4 | 16.8 | 17.3 | 16.7 | 17.7 |
| M3 | Surface | 10.6 | 13.9 | 12.1 | 13.2 | 11.9 | 10.6 | 12.4 | 10.7 |
| | Bottom | 16.4 | 16.3 | 15.0 | 15.4 | 14.3 | 14.6 | 14.2 | 16.2 |
| M4 | Surface | 15.1 | 18.8 | 23.5 | 20.6 | 21.1 | 19.5 | 18.9 | 20.7 |
| | Bottom | 22.5 | 22.6 | 24.0 | 22.2 | 21.6 | 20.0 | 21.4 | 21.5 |
| M5 | Surface | 16.6 | 21.0 | 20.9 | 21.2 | 21.7 | 22.7 | 21.0 | 20.1 |
| | Bottom | 26.5 | 23.0 | 21.8 | 21.9 | 23.9 | 23.5 | 22.9 | 23.1 |
| M6 | Surface | 8.6 | 11.7 | 10.4 | 9.7 | 14.6 | 8.6 | 13.1 | 8.0 |
| | Bottom | 14.9 | 19.5 | 17.0 | 14.2 | 17.7 | 17.9 | 14.0 | 18.2 |

(Continued)

Table 25 (Concluded)

| Station No. | Depth | Base | Plan 1 | Plan 2 | Plan 3 | Plan 4 | Plan 5 | Plan 6 | Plan 7 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Bay Stations (Continued) | | | | | |
| M7 | Surface | 7.6 | 14.3 | 12.5 | 12.8 | 12.7 | 13.3 | 12.3 | 11.8 |
| | Bottom | 14.2 | 16.1 | 14.5 | 14.8 | 14.3 | 14.0 | 13.8 | 14.4 |
| M8 | Surface | 10.4 | 15.6 | 12.0 | 14.4 | 13.5 | 12.4 | 10.1 | 14.2 |
| | Bottom | 14.5 | 15.6 | 13.6 | 14.8 | 14.6 | 13.6 | 16.5 | 15.1 |
| M9 | Surface | 15.9 | 18.7 | 18.6 | 15.6 | 18.1 | 18.6 | 17.5 | 18.2 |
| | Bottom | 18.5 | 21.4 | 19.8 | 18.5 | 18.9 | 18.9 | 17.3 | 18.8 |
| M10 | Surface | 11.3 | 16.0 | 16.8 | 15.4 | 17.0 | 18.3 | 16.4 | 17.7 |
| | Bottom | 21.7 | 20.7 | 20.0 | 19.2 | 19.0 | 18.6 | 18.8 | 19.2 |
| M11 | Surface | 13.2 | 17.0 | 14.9 | 16.4 | 16.3 | 14.7 | 15.4 | 17.0 |
| | Bottom | 18.9 | 18.1 | 16.2 | 18.0 | 17.6 | 16.4 | 16.5 | 19.0 |
| M12 | Surface | 14.1 | 13.3 | 11.7 | 14.7 | 13.6 | 13.2 | 13.1 | 12.8 |
| | Bottom | 15.8 | 16.4 | 14.7 | 16.5 | 16.4 | 14.2 | 15.8 | 17.5 |
| M13 | Surface | 17.7 | 17.9 | 16.8 | 18.8 | 18.9 | 16.5 | 16.8 | 18.9 |
| | Bottom | 20.4 | 18.9 | 18.6 | 21.4 | 20.6 | 19.1 | 18.9 | 20.7 |
| M14 | Surface | 17.5 | 15.6 | 12.7 | 15.3 | 12.0 | 12.4 | 14.4 | 13.6 |
| | Bottom | 21.7 | 19.1 | 18.9 | 20.5 | 19.8 | 18.6 | 20.7 | 21.2 |
| M15 | Surface | 17.6 | 20.9 | 23.2 | 21.7 | 21.3 | 19.2 | 19.5 | 24.4 |
| | Bottom | 23.3 | 21.2 | 23.6 | 22.2 | 22.1 | 20.1 | 21.3 | 25.1 |
| M16 | Surface | 13.4 | 18.6 | 17.8 | 19.0 | 17.9 | 17.4 | 16.3 | 17.7 |
| | Bottom | 22.6 | 24.2 | 23.9 | 22.2 | 21.4 | 22.3 | 21.2 | 22.2 |
| M17 | Surface | 20.1 | -- | 21.3 | -- | -- | -- | -- | 19.8 |
| | Bottom | 23.9 | -- | 23.2 | -- | -- | -- | -- | 24.8 |
| M18 | Surface | 19.4 | 19.1 | 18.6 | 19.1 | 21.2 | 19.2 | 19.5 | 18.5 |
| | Bottom | 26.8 | 25.3 | 23.4 | 23.1 | 24.5 | 25.2 | 24.0 | 23.9 |
| M19 | Surface | 20.7 | 20.4 | 23.1 | 22.0 | 21.3 | 22.0 | 21.0 | 20.5 |
| | Bottom | 26.0 | 24.9 | 26.4 | 26.2 | 26.1 | 25.9 | 25.2 | 24.6 |
| M20 | Surface | 22.0 | 19.5 | 18.9 | 20.5 | 20.8 | 20.0 | 20.5 | 20.6 |
| | Bottom | 25.7 | 24.9 | 25.4 | 24.3 | 24.4 | 23.7 | 24.1 | 25.0 |
| M21 | Surface | 25.7 | 24.7 | 22.5 | 24.0 | 23.6 | 25.8 | 24.7 | 25.7 |
| | Bottom | 28.4 | 27.1 | 25.4 | 26.0 | 26.2 | 26.7 | 26.0 | 25.2 |
| M22 | Surface | 26.8 | 25.8 | 22.2 | 23.7 | 24.6 | 25.9 | 23.7 | 23.4 |
| | Bottom | 28.1 | 24.8 | 24.7 | 25.0 | 25.6 | 26.5 | 24.3 | 25.2 |
| M23 | Surface | 27.4 | 25.5 | 24.7 | 23.5 | 25.3 | 26.4 | 24.3 | 24.8 |
| | Bottom | 30.1 | 27.7 | 28.8 | 28.3 | 29.8 | 29.7 | 29.2 | 29.0 |
| M24 | Surface | 12.6 | 16.3 | 15.7 | 16.0 | 16.3 | 16.5 | 15.9 | 18.1 |
| | Bottom | 16.8 | 17.8 | 15.9 | 16.6 | 16.9 | 16.9 | 16.1 | 18.3 |
| M25 | Surface | 16.7 | 18.6 | 22.8 | 18.5 | 19.9 | 19.6 | 19.5 | 19.6 |
| | Bottom | 21.8 | 21.2 | 23.2 | 20.2 | 20.4 | 20.4 | 20.4 | 21.2 |
| M26 | Surface | 24.8 | 21.1 | 22.1 | 20.2 | 23.1 | 23.9 | 21.2 | 20.6 |
| | Bottom | 26.3 | 23.9 | 22.8 | 22.6 | 24.5 | 24.7 | 22.7 | 23.3 |
| M27 | Surface | 24.6 | 25.3 | 24.0 | 22.1 | 23.3 | 25.2 | 23.4 | 24.2 |
| | Bottom | 27.3 | 26.2 | 24.7 | 22.8 | 25.2 | 25.9 | 23.7 | 26.8 |

Table 26

Average Salinities (Total Salts, ppt) for Critical Areas 1, 2, 3, and 4

Total Freshwater Inflow = 15,500 cfs

| | | Area 1 Stations (South of Channel) | | | | Area 2 Stations (Whitehouse) | | | | | | Area 3 Stations (Cedar Point) | | | | | | Area 4 Stations (Klondike) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Plan | Depth | M-9 | M-10 | M-25 | Area Average | M-4 | M-15 | M-16 | M-19 | M-20 | Area Average | S-4 | S-7 | S-10 | S-12 | S-14 | Area Average | M-11 | M-12 | M-13 | M-14 | M-24 | Area Average |
| Base | Surface | 18.8 | 18.1 | 22.5 | 19.8 | 24.4 | 22.1 | 22.7 | 25.1 | 26.2 | 24.1 | 24.4 | 24.7 | 26.3 | 26.8 | 27.1 | 25.9 | 16.4 | 17.4 | 20.3 | 20.2 | 14.4 | 17.7 |
| | Bottom | 22.0 | 23.4 | 25.3 | 23.6 | 26.0 | 24.9 | 26.0 | 27.5 | 28.1 | 26.5 | 26.8 | 25.7 | 27.4 | 28.2 | 27.7 | 27.2 | 21.6 | 19.1 | 24.7 | 24.3 | 20.8 | 22.1 |
| 1 | Surface | 20.8 | 20.5 | 23.3 | 21.5 | 22.1 | 22.3 | 23.1 | 23.6 | 23.8 | 23.0 | 25.6 | 25.9 | 26.4 | 25.4 | 25.3 | 25.7 | 18.3 | 16.2 | 20.2 | 18.7 | 18.3 | 18.3 |
| | Bottom | 22.3 | 22.9 | 23.8 | 23.0 | 25.0 | 23.0 | 27.0 | 27.0 | 27.4 | 25.9 | 26.1 | 26.5 | 28.8 | 28.9 | 26.5 | 27.4 | 19.1 | 18.0 | 22.5 | 21.1 | 19.0 | 19.9 |
| 2 | Surface | 20.7 | 19.5 | 24.3 | 21.5 | 24.7 | 24.2 | 22.8 | 24.5 | 24.6 | 24.2 | 26.6 | 26.6 | 27.1 | 27.5 | 26.8 | 26.9 | 17.7 | 15.0 | 19.5 | 18.0 | 17.2 | 17.5 |
| | Bottom | 21.5 | 21.7 | 24.6 | 22.6 | 25.2 | 24.6 | 25.4 | 27.6 | 27.4 | 26.0 | 27.4 | 27.3 | 28.5 | 28.9 | 27.5 | 27.9 | 18.8 | 17.5 | 20.9 | 20.6 | 17.4 | 19.0 |
| 3 | Surface | 18.1 | 18.2 | 22.3 | 19.5 | 24.0 | 23.2 | 23.7 | 24.7 | 24.9 | 24.1 | 26.3 | 25.9 | 26.6 | 26.6 | 26.0 | 26.3 | 18.6 | 16.9 | 21.2 | 18.9 | 17.2 | 18.6 |
| | Bottom | 19.6 | 20.9 | 22.7 | 21.1 | 25.1 | 23.6 | 25.7 | 28.2 | 27.4 | 26.0 | 26.9 | 26.6 | 28.8 | 28.5 | 27.2 | 27.6 | 19.8 | 19.3 | 24.0 | 22.7 | 17.5 | 20.7 |
| 4 | Surface | 19.6 | 18.6 | 22.1 | 20.1 | 23.9 | 22.4 | 23.3 | 24.2 | 24.6 | 23.7 | 22.6 | 22.3 | 26.2 | 26.6 | 26.1 | 24.8 | 18.3 | 16.0 | 20.6 | 18.7 | 17.6 | 18.2 |
| | Bottom | 20.1 | 20.3 | 22.9 | 21.1 | 25.4 | 23.4 | 25.2 | 27.9 | 27.5 | 25.9 | 25.9 | 26.2 | 28.0 | 28.7 | 27.1 | 27.2 | 19.3 | 19.6 | 23.3 | 21.9 | 17.7 | 20.4 |
| 5 | Surface | 19.5 | 19.0 | 22.9 | 20.5 | 22.8 | 21.5 | 23.6 | 24.0 | 24.7 | 23.3 | 26.4 | 26.0 | 27.9 | 26.6 | 26.5 | 26.7 | 18.1 | 15.1 | 19.9 | 18.6 | 18.3 | 18.0 |
| | Bottom | 19.7 | 20.5 | 23.7 | 21.3 | 24.0 | 22.3 | 25.8 | 27.9 | 27.9 | 25.6 | 26.8 | 27.0 | 28.9 | 29.4 | 27.5 | 27.9 | 19.3 | 17.7 | 22.4 | 21.9 | 18.5 | 20.0 |
| 6 | Surface | 18.6 | 18.3 | 22.0 | 19.6 | 23.4 | 21.8 | 23.3 | 23.5 | 24.9 | 23.4 | 24.1 | 24.5 | 25.3 | 24.9 | 24.6 | 24.7 | 17.5 | 15.5 | 19.5 | 18.3 | 17.0 | 17.6 |
| | Bottom | 18.8 | 19.6 | 22.6 | 20.3 | 25.0 | 22.9 | 25.7 | 27.0 | 27.4 | 25.6 | 25.1 | 25.4 | 27.2 | 28.0 | 26.1 | 26.4 | 18.3 | 18.6 | 21.8 | 21.9 | 17.1 | 19.5 |
| 7 | Surface | 19.1 | 18.5 | 22.4 | 20.0 | 22.3 | 25.5 | 22.3 | 23.6 | 22.3 | 23.2 | 24.6 | 24.3 | 25.7 | 26.6 | 25.1 | 25.3 | 19.8 | 15.7 | 21.3 | 19.2 | 19.2 | 19.0 |
| | Bottom | 19.4 | 19.9 | 23.1 | 20.8 | 24.4 | 26.2 | 25.0 | 27.2 | 27.3 | 26.0 | 25.3 | 25.2 | 27.8 | 29.9 | 26.3 | 26.9 | 21.2 | 20.3 | 22.7 | 22.6 | 19.5 | 21.3 |

Table 27

Effects of Plans on Average Salinities in Areas 1, 2, 3, and 4 (Total Salts, ppt)

Total Freshwater Inflow = 15,500 cfs

| | | Area 1 (South of Channel) | | Area 2 (Whitehouse) | | Area 3 (Cedar Point) | | Area 4 (Klondike) | |
|---|---|---|---|---|---|---|---|---|---|
| Plan | Depth | Area Average | Difference* | Area Average | Difference* | Area Average | Difference* | Area Average | Difference* |
| Base | Surface | 19.8 | | 24.1 | | 25.9 | | 17.7 | |
| | Bottom | 23.6 | | 26.5 | | 27.2 | | 22.1 | |
| | Average | 21.7 | | 25.3 | | 26.6 | | 19.9 | |
| 1 | Surface | 21.5 | +1.7 | 23.0 | -1.1 | 25.7 | -0.2 | 18.3 | +0.6 |
| | Bottom | 23.0 | -0.6 | 25.9 | -0.6 | 27.4 | +0.2 | 19.9 | -2.2 |
| | Average | 22.3 | +0.6 | 24.4 | -0.9 | 26.6 | 0.0 | 19.1 | -0.8 |
| 2 | Surface | 21.5 | +1.7 | 24.2 | +0.1 | 26.9 | +1.0 | 17.5 | -0.2 |
| | Bottom | 22.6 | -1.0 | 26.0 | -0.5 | 27.9 | +0.7 | 19.0 | -3.1 |
| | Average | 22.1 | +0.4 | 25.1 | -0.2 | 27.4 | +0.8 | 18.3 | -1.6 |
| 3 | Surface | 19.5 | -0.3 | 24.1 | 0.0 | 26.3 | +0.4 | 18.6 | +0.9 |
| | Bottom | 21.1 | -2.5 | 26.0 | -0.5 | 27.9 | +0.7 | 20.7 | -1.4 |
| | Average | 20.3 | -1.4 | 25.1 | -0.2 | 27.1 | +0.5 | 19.7 | -0.2 |
| 4 | Surface | 20.1 | +0.3 | 23.7 | -0.4 | 25.9 | 0.0 | 18.2 | +0.5 |
| | Bottom | 21.1 | -2.5 | 25.9 | -0.6 | 27.2 | 0.0 | 20.4 | -1.7 |
| | Average | 20.6 | -1.1 | 24.8 | -0.5 | 26.6 | 0.0 | 19.3 | -0.6 |
| 5 | Surface | 20.5 | +0.7 | 23.3 | -0.8 | 26.5 | +0.6 | 18.0 | +0.3 |
| | Bottom | 21.3 | -2.3 | 25.6 | -0.9 | 27.9 | +0.7 | 20.0 | -2.1 |
| | Average | 20.9 | -0.8 | 24.4 | -0.9 | 27.2 | +0.6 | 19.0 | -0.9 |
| 6 | Surface | 19.6 | -0.2 | 23.4 | -0.7 | 24.7 | -1.2 | 17.6 | -0.1 |
| | Bottom | 20.3 | -3.3 | 25.6 | -0.9 | 26.4 | -0.8 | 19.5 | -2.6 |
| | Average | 19.9 | -1.8 | 24.5 | -0.8 | 25.6 | -1.0 | 18.6 | -1.3 |
| 7 | Surface | 20.0 | +0.2 | 23.2 | -0.9 | 25.3 | -0.6 | 19.0 | +1.3 |
| | Bottom | 20.8 | -2.8 | 26.0 | -0.5 | 26.9 | -0.3 | 21.3 | -0.8 |
| | Average | 20.4 | -1.3 | 24.6 | -0.7 | 26.1 | -0.5 | 20.2 | +0.3 |

* Plan test value minus base test value.

Table 28

Effects of Plan 2

Q = 63,500 cfs

| Maximum Current Velocities | | | | | | Percent of Total Flow Downstream | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Base, fps | | Plan 2 | | | Base, % Downstream | | Plan 2 | |
| Station | | Surface | Bottom | Surface | Bottom | Station | Surface | Bottom | Surface | Bottom |
| 1 | Flood | 3.3 | 2.3 | NC | - | 1 | 46.1 | 53.0 | NC | NC |
| | Ebb | 2.9 | 2.7 | NC | NC | | | | | |
| 2 | Flood | 2.3 | 1.6 | - | - | 2 | 50.3 | 33.6 | NC | - |
| | Ebb | 2.2 | 0.8 | - | NC | | | | | |
| 3 | Flood | 0.8 | 1.2 | + | - | 3 | 67.8 | 15.0 | -- | NC |
| | Ebb | 1.9 | 0.6 | - | NC | | | | | |
| 4 | Flood | 1.0 | 0.8 | NC | NC | 4 | 62.5 | 27.2 | NC | NC |
| | Ebb | 1.3 | 0.4 | NC | NC | | | | | |
| 5 | Flood | 0.8 | 0.8 | NC | NC | 5 | 65.0 | 35.0 | NC | NC |
| | Ebb | 1.0 | 0.5 | + | NC | | | | | |
| 6 | Flood | 0.6 | 0.8 | NC | + | 6 | 78.3 | 45.7 | NC | -- |
| | Ebb | 1.4 | 1.0 | NC | - | | | | | |
| 7 | Flood | 0.9 | 1.1 | NC | + | 7 | 31.0 | 32.8 | NC | NC |
| | Ebb | 0.7 | 0.8 | NC | NC | | | | | |
| 8 | Flood | 0.5 | 1.4 | NC | NC | 8 | 92.5 | 25.5 | NC | - |
| | Ebb | 3.0 | 0.8 | + | - | | | | | |
| 9 | Flood | 0.1 | 1.6 | NC | - | 9 | 98.1 | 38.6 | NC | NC |
| | Ebb | 2.2 | 1.0 | - | NC | | | | | |
| 10 | Flood | 0.7 | 0.2 | NC | NC | 10 | 86.3 | 61.3 | NC | - |
| | Ebb | 2.3 | 0.4 | + | + | | | | | |

Note: Key to differences:

| Symbols | Difference (Velocity) | Difference (Flow Predicted) |
|---|---|---|
| NC | ≤ ± 0.3 fps (No change) | ≤ ± 10% (No change) |
| + | 0.4-1.0 fps increase | 10.1 to 20% increase in flow downstream |
| ++ | >1.0 fps increase | >20% increase in flow downstream |
| - | 0.4-1.0 fps decrease | 10 to 20% decrease in flow downstream |
| -- | >1.0 fps decrease | >20% decrease in flow downstream |

Table 29

Effects of Plan 2, Station 1, Surface

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 1.5 | 2.4 |
| 1.0 | 2.3 | 3.4 |
| 2.0 | 3.3 | 3.6 |
| 3.0 | 3.2 | 3.0 |
| 4.0 | 2.9 | 2.8 |
| 5.0 | 2.9 | 2.5 |
| 6.0 | 2.6 | 2.1 |
| 7.0 | 2.3 | 1.7 |
| 8.0 | 1.7 | 1.4 |
| 9.0 | 1.2 | 0.4 |
| 10.0 | 0.3 | -0.1 |
| 11.0 | -0.4 | -0.6 |
| 12.0 | -1.4 | -1.4 |
| 13.0 | -2.2 | -2.0 |
| 14.0 | -2.7 | -2.4 |
| 15.0 | -2.9 | -2.7 |
| 16.0 | -2.8 | -2.6 |
| 17.0 | -2.3 | -2.6 |
| 18.0 | -2.0 | -3.1 |
| 19.0 | -1.9 | -2.3 |
| 20.0 | -1.3 | -1.7 |
| 21.0 | -1.1 | -0.9 |
| 22.0 | -0.3 | -0.3 |
| 23.0 | 0.3 | 0.3 |
| 24.0 | 0.8 | 1.0 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 2.0 | 3.3 | 15.0 | -2.9 | 46.1 |
| Plan 2 | 2.0 | 3.6 | 18.0 | -3.1 | 48.3 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 30

Effects of Plan 2, Station 1, Bottom

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 1.9 | 1.4 |
| 1.0 | 1.9 | 1.9 |
| 2.0 | 2.1 | 1.7 |
| 3.0 | 2.3 | 1.9 |
| 4.0 | 2.3 | 1.4 |
| 5.0 | 1.9 | 1.6 |
| 6.0 | 2.1 | 1.4 |
| 7.0 | 1.9 | 1.2 |
| 8.0 | 1.6 | 1.0 |
| 9.0 | 1.0 | 0.3 |
| 10.0 | 0.3 | -0.1 |
| 11.0 | -0.5 | -0.3 |
| 12.0 | -1.6 | -1.4 |
| 13.0 | -2.3 | -1.6 |
| 14.0 | -2.3 | -2.5 |
| 15.0 | -2.6 | -1.8 |
| 16.0 | -2.3 | -2.5 |
| 17.0 | -2.7 | -1.8 |
| 18.0 | -2.6 | -2.3 |
| 19.0 | -2.6 | -2.0 |
| 20.0 | -2.3 | -1.4 |
| 21.0 | -1.5 | -1.0 |
| 22.0 | 0.3 | -0.1 |
| 23.0 | 0.3 | 0.1 |
| 24.0 | 0.9 | 0.5 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 3.0 | 2.3 | 17.0 | -2.7 | 53.0 |
| Plan 2 | 3.0 | 1.9 | 14.0 | -2.5 | 57.1 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 31

Effects of Plan 2, Station 2, Surface

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.9 | 0.9 |
| 1.0 | 1.4 | 1.4 |
| 2.0 | 1.6 | 1.6 |
| 3.0 | 2.3 | 1.7 |
| 4.0 | 2.2 | 1.6 |
| 5.0 | 1.9 | 1.3 |
| 6.0 | 1.7 | 1.3 |
| 7.0 | 1.5 | 1.1 |
| 8.0 | 1.2 | 0.7 |
| 9.0 | 0.7 | 0.4 |
| 10.0 | -0.3 | -0.3 |
| 11.0 | -0.7 | -0.3 |
| 12.0 | -1.2 | -0.3 |
| 13.0 | -1.3 | -0.8 |
| 14.0 | -1.3 | -0.8 |
| 15.0 | -1.7 | -0.6 |
| 16.0 | -2.2 | -0.8 |
| 17.0 | -1.7 | -0.5 |
| 18.0 | -1.4 | -1.7 |
| 19.0 | -1.0 | -1.6 |
| 20.0 | -0.9 | -1.0 |
| 21.0 | -1.0 | -0.3 |
| 22.0 | -0.5 | 0.1 |
| 23.0 | -0.5 | 0.3 |
| 24.0 | 0.3 | 0.8 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 3.0 | 2.3 | 16.0 | -2.2 | 50.3 |
| Plan 2 | 3.0 | 1.7 | 18.0 | -1.7 | 40.9 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 32

Effects of Plan 2, Station 2, Bottom

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.3 | 0.7 |
| 1.0 | 0.8 | 0.7 |
| 2.0 | 0.9 | 0.8 |
| 3.0 | 0.9 | 0.8 |
| 4.0 | 1.3 | 0.6 |
| 5.0 | 1.2 | 1.0 |
| 6.0 | 1.6 | 1.0 |
| 7.0 | 1.4 | 1.2 |
| 8.0 | 1.1 | 0.7 |
| 9.0 | 0.7 | 0.7 |
| 10.0 | 0.3 | 0.3 |
| 11.0 | -0.3 | 0.1 |
| 12.0 | -0.4 | -0.1 |
| 13.0 | -0.5 | -0.4 |
| 14.0 | -0.8 | -0.7 |
| 15.0 | -0.6 | 0.0 |
| 16.0 | -0.5 | -0.3 |
| 17.0 | -0.4 | -0.2 |
| 18.0 | -0.4 | -0.2 |
| 19.0 | -0.3 | -0.1 |
| 20.0 | -0.3 | -0.1 |
| 21.0 | -0.3 | -0.1 |
| 22.0 | -0.3 | 0.1 |
| 23.0 | -0.3 | 0.4 |
| 24.0 | 0.3 | 0.4 |

| | Maximum Flood | | Maximum Ebb | | |
|---|---|---|---|---|---|
| Plan | Time hr | Velocity fps | Time hr | Velocity fps | % Total Flow Downstream |
| Base | 6.0 | 1.6 | 14.0 | -0.8 | 33.6 |
| Plan 2 | 7.0 | 1.2 | 14.0 | -0.7 | 19.8 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 33

Effects of Plan 2, Station 3, Surface

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.1 | 1.1 |
| 1.0 | 0.2 | 1.5 |
| 2.0 | 0.5 | 1.2 |
| 3.0 | 0.7 | 1.1 |
| 4.0 | 0.5 | 1.0 |
| 5.0 | 0.5 | 0.9 |
| 6.0 | 0.6 | 1.1 |
| 7.0 | 0.8 | 1.1 |
| 8.0 | 0.7 | 1.0 |
| 9.0 | 0.5 | 0.4 |
| 10.0 | 0.2 | 0.1 |
| 11.0 | -0.1 | -0.1 |
| 12.0 | -0.4 | -0.4 |
| 13.0 | -0.8 | -0.4 |
| 14.0 | -1.9 | -0.8 |
| 15.0 | -1.7 | -1.4 |
| 16.0 | -1.7 | -1.5 |
| 17.0 | -1.6 | -1.3 |
| 18.0 | -0.8 | -1.1 |
| 19.0 | -0.8 | -0.8 |
| 20.0 | -0.6 | -0.8 |
| 21.0 | -0.4 | -0.5 |
| 22.0 | -0.3 | -0.3 |
| 23.0 | -0.2 | 0.2 |
| 24.0 | -0.1 | 0.4 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 7.0 | 0.8 | 14.0 | -1.9 | 67.8 |
| Plan 2 | 1.0 | 1.5 | 16.0 | -1.5 | 46.7 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 34

Effects of Plan 2, Station 3, Bottom

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.8 | 0.3 |
| 1.0 | 0.8 | 0.3 |
| 2.0 | 0.8 | 0.4 |
| 3.0 | 0.7 | 0.4 |
| 4.0 | 0.8 | 0.2 |
| 5.0 | 0.6 | 0.3 |
| 6.0 | 0.8 | 0.7 |
| 7.0 | 0.8 | 0.5 |
| 8.0 | 0.6 | 0.6 |
| 9.0 | 0.6 | 0.3 |
| 10.0 | 0.4 | 0.4 |
| 11.0 | 0.2 | 0.2 |
| 12.0 | 0.1 | 0.1 |
| 13.0 | 0.1 | 0.1 |
| 14.0 | -0.1 | -0.2 |
| 15.0 | -0.2 | -0.5 |
| 16.0 | -0.6 | -0.4 |
| 17.0 | -0.5 | -0.5 |
| 18.0 | -0.5 | -0.3 |
| 19.0 | -0.1 | -0.1 |
| 20.0 | 0.1 | 0.1 |
| 21.0 | 0.8 | 0.5 |
| 22.0 | 0.8 | 0.8 |
| 23.0 | 1.0 | 0.8 |
| 24.0 | 1.2 | 0.5 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 24.0 | 1.2 | 16.0 | -0.6 | 15.0 |
| Plan 2 | 22.0 | 0.8 | 15.0 | -0.5 | 21.7 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 35

Effects of Plan 2, Station 4, Surface

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.3 | 0.4 |
| 1.0 | 0.8 | 0.4 |
| 2.0 | 1.0 | 0.8 |
| 3.0 | 0.8 | 1.1 |
| 4.0 | 0.8 | 1.1 |
| 5.0 | 0.5 | 1.1 |
| 6.0 | 0.5 | 1.0 |
| 7.0 | 0.5 | 0.9 |
| 8.0 | 0.5 | 0.6 |
| 9.0 | 0.3 | 0.4 |
| 10.0 | 0.2 | -0.1 |
| 11.0 | 0.2 | -0.2 |
| 12.0 | -0.2 | -0.4 |
| 13.0 | -0.5 | -1.0 |
| 14.0 | -0.8 | -1.1 |
| 15.0 | -1.3 | -1.1 |
| 16.0 | -1.2 | -1.1 |
| 17.0 | -1.3 | -1.2 |
| 18.0 | -1.1 | -1.3 |
| 19.0 | -1.2 | -1.2 |
| 20.0 | -1.1 | -0.8 |
| 21.0 | -0.8 | -0.8 |
| 22.0 | -0.6 | -0.5 |
| 23.0 | -0.3 | -0.2 |
| 24.0 | -0.2 | 0.4 |

| | Maximum Flood | | Maximum Ebb | | |
|---|---|---|---|---|---|
| Plan | Time hr | Velocity fps | Time hr | Velocity fps | % Total Flow Downstream |
| Base | 2.0 | 1.0 | 17.0 | -1.3 | 62.5 |
| Plan 2 | 3.0 | 1.1 | 18.0 | -1.3 | 57.3 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 36

Effects of Plan 2, Station 4, Bottom

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.8 | 1.0 |
| 1.0 | 0.8 | 0.8 |
| 2.0 | 0.7 | 0.8 |
| 3.0 | 0.7 | 0.8 |
| 4.0 | 0.5 | 0.6 |
| 5.0 | 0.4 | 0.6 |
| 6.0 | 0.3 | 0.7 |
| 7.0 | 0.6 | 0.8 |
| 8.0 | 0.5 | 0.8 |
| 9.0 | 0.5 | 0.6 |
| 10.0 | 0.6 | 0.4 |
| 11.0 | 0.6 | 0.3 |
| 12.0 | -0.3 | 0.1 |
| 13.0 | -0.4 | -0.1 |
| 14.0 | -0.4 | -0.1 |
| 15.0 | -0.4 | -0.2 |
| 16.0 | -0.3 | -0.2 |
| 17.0 | -0.2 | -0.3 |
| 18.0 | -0.2 | -0.4 |
| 19.0 | -0.2 | -0.4 |
| 20.0 | -0.2 | -0.4 |
| 21.0 | -0.2 | -0.3 |
| 22.0 | -0.2 | -0.1 |
| 23.0 | 0.2 | 0.1 |
| 24.0 | 0.2 | 0.6 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 0.0 | 0.8 | 13.0 | -0.4 | 27.2 |
| Plan 2 | 0.0 | 1.0 | 18.0 | -0.4 | 23.2 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 37

Effects of Plan 2, Station 5, Surface

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.1 | 0.1 |
| 1.0 | 0.2 | 0.1 |
| 2.0 | 0.3 | 0.3 |
| 3.0 | 0.6 | 0.5 |
| 4.0 | 0.5 | 0.5 |
| 5.0 | 0.7 | 0.6 |
| 6.0 | 0.8 | 0.6 |
| 7.0 | 0.8 | 0.6 |
| 8.0 | 0.5 | 0.4 |
| 9.0 | 0.4 | 0.2 |
| 10.0 | 0.4 | 0.1 |
| 11.0 | 0.2 | -0.1 |
| 12.0 | -0.5 | -0.3 |
| 13.0 | -0.6 | -0.3 |
| 14.0 | -0.8 | -0.5 |
| 15.0 | -0.9 | -1.0 |
| 16.0 | -0.9 | -1.3 |
| 17.0 | -1.0 | -1.4 |
| 18.0 | -0.9 | -1.3 |
| 19.0 | -0.9 | -1.3 |
| 20.0 | -0.8 | -1.0 |
| 21.0 | -1.0 | -0.9 |
| 22.0 | -0.8 | -0.6 |
| 23.0 | -0.7 | -0.4 |
| 24.0 | -0.4 | -0.2 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 6.0 | 0.8 | 17.0 | -1.0 | 65.0 |
| Plan 2 | 5.0 | 0.6 | 17.0 | -1.4 | 71.9 |

* Time is expressed in hours after moon's transit of 88th meridian.

AD-A068 322 ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS F/G 8/8
MOBILE BA MODEL STUDY. REPORT 2. EFFECTS OF ENLARGED NAVIGATION--ETC(U)
MAR 79 R C BERGER, R A BOLAND

UNCLASSIFIED WES-TR-H-75-13-2 NL

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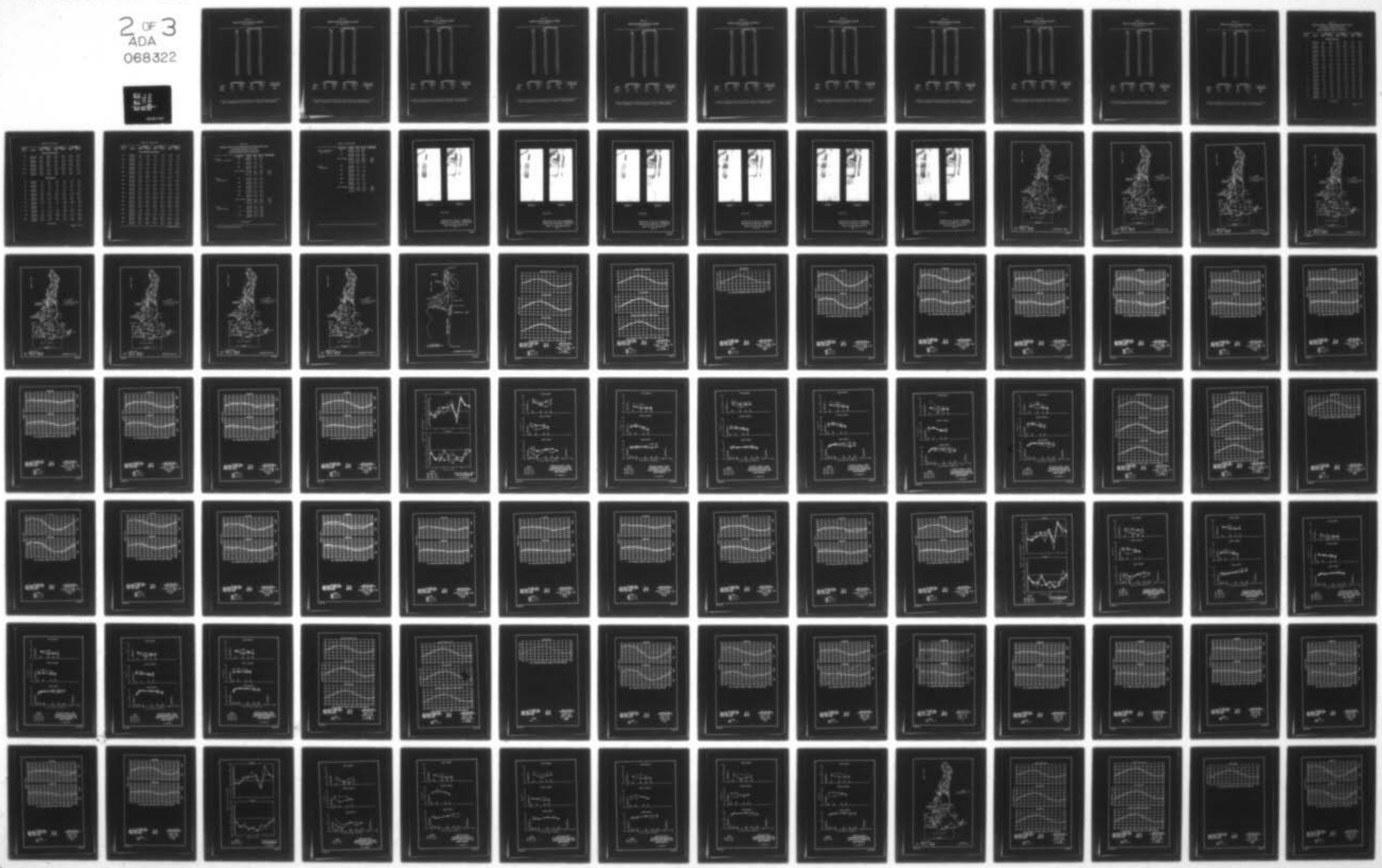

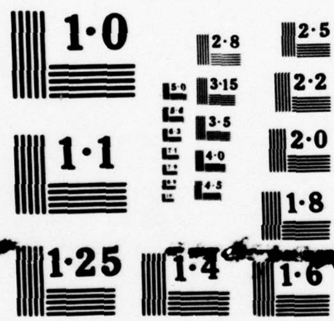


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Table 38

Effects of Plan 2, Station 5, Bottom

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.5 | 0.8 |
| 1.0 | 0.5 | 1.0 |
| 2.0 | 0.5 | 0.9 |
| 3.0 | 0.6 | 0.6 |
| 4.0 | 0.8 | 0.6 |
| 5.0 | 0.6 | 0.6 |
| 6.0 | 0.5 | 0.6 |
| 7.0 | 0.3 | 0.6 |
| 8.0 | 0.5 | 0.5 |
| 9.0 | 0.5 | 0.4 |
| 10.0 | 0.2 | 0.4 |
| 11.0 | 0.2 | 0.4 |
| 12.0 | 0.2 | 0.1 |
| 13.0 | -0.2 | -0.1 |
| 14.0 | -0.2 | -0.1 |
| 15.0 | -0.2 | -0.2 |
| 16.0 | -0.4 | -0.2 |
| 17.0 | -0.5 | -0.4 |
| 18.0 | -0.5 | -0.5 |
| 19.0 | -0.5 | -0.5 |
| 20.0 | -0.5 | -0.5 |
| 21.0 | -0.4 | -0.4 |
| 22.0 | -0.2 | -0.1 |
| 23.0 | 0.2 | 0.2 |
| 24.0 | 0.3 | 0.4 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 4.0 | 0.8 | 17.0 | -0.5 | 35.0 |
| Plan 2 | 1.0 | 1.0 | 18.0 | -0.5 | 28.3 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 39

Effects of Plan 2, Station 6, Surface

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.1 | 0.1 |
| 1.0 | 0.1 | 0.3 |
| 2.0 | 0.6 | 0.4 |
| 3.0 | 0.5 | 0.2 |
| 4.0 | 0.3 | 0.1 |
| 5.0 | 0.2 | 0.1 |
| 6.0 | 0.1 | 0.1 |
| 7.0 | 0.1 | 0.1 |
| 8.0 | 0.1 | 0.1 |
| 9.0 | 0.1 | 0.1 |
| 10.0 | 0.1 | 0.1 |
| 11.0 | -0.1 | -0.1 |
| 12.0 | -0.1 | -0.2 |
| 13.0 | -0.5 | -0.3 |
| 14.0 | -0.9 | -0.8 |
| 15.0 | -1.4 | -1.6 |
| 16.0 | -0.9 | -1.4 |
| 17.0 | -0.8 | -1.1 |
| 18.0 | -0.8 | -1.0 |
| 19.0 | -0.8 | -0.9 |
| 20.0 | -0.8 | -0.9 |
| 21.0 | -0.6 | -0.8 |
| 22.0 | -0.6 | -0.7 |
| 23.0 | -0.5 | -0.5 |
| 24.0 | -0.1 | -0.2 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 2.0 | 0.6 | 15.0 | -1.4 | 78.3 |
| Plan 2 | 2.0 | 0.4 | 15.0 | -1.6 | 84.3 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 40

Effects of Plan 2, Station 6, Bottom

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.1 | 1.0 |
| 1.0 | 0.5 | 1.2 |
| 2.0 | 0.7 | 1.2 |
| 3.0 | 0.8 | 1.2 |
| 4.0 | 0.8 | 1.2 |
| 5.0 | 0.7 | 1.0 |
| 6.0 | 0.7 | 1.0 |
| 7.0 | 0.6 | 0.9 |
| 8.0 | 0.5 | 0.9 |
| 9.0 | 0.4 | 0.7 |
| 10.0 | 0.3 | 0.5 |
| 11.0 | 0.2 | 0.3 |
| 12.0 | 0.1 | 0.2 |
| 13.0 | 0.1 | 0.1 |
| 14.0 | -0.1 | -0.1 |
| 15.0 | -0.1 | -0.1 |
| 16.0 | -0.3 | -0.2 |
| 17.0 | -0.8 | -0.4 |
| 18.0 | -1.0 | -0.6 |
| 19.0 | -0.9 | -0.6 |
| 20.0 | -0.9 | -0.2 |
| 21.0 | -0.7 | -0.2 |
| 22.0 | -0.3 | 0.2 |
| 23.0 | -0.1 | 0.6 |
| 24.0 | -0.1 | 0.8 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 3.0 | 0.8 | 18.0 | -1.0 | 45.7 |
| Plan 2 | 1.0 | 1.2 | 18.0 | -0.6 | 16.0 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 41

Effects of Plan 2, Station 7, Surface

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.6 | 0.5 |
| 1.0 | 0.6 | 0.6 |
| 2.0 | 0.7 | 0.7 |
| 3.0 | 0.7 | 0.6 |
| 4.0 | 0.8 | 0.7 |
| 5.0 | 0.9 | 0.5 |
| 6.0 | 0.7 | 0.5 |
| 7.0 | 0.6 | 0.5 |
| 8.0 | 0.6 | 0.6 |
| 9.0 | 0.6 | 0.6 |
| 10.0 | 0.6 | 0.3 |
| 11.0 | 0.3 | 0.2 |
| 12.0 | 0.3 | 0.2 |
| 13.0 | 0.3 | -0.2 |
| 14.0 | -0.3 | -0.2 |
| 15.0 | -0.6 | -0.3 |
| 16.0 | -0.6 | -0.6 |
| 17.0 | -0.6 | -0.6 |
| 18.0 | -0.7 | -0.6 |
| 19.0 | -0.6 | -0.6 |
| 20.0 | -0.5 | -0.6 |
| 21.0 | -0.3 | -0.2 |
| 22.0 | 0.3 | 0.2 |
| 23.0 | 0.3 | 0.3 |
| 24.0 | 0.4 | 0.4 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 5.0 | 0.9 | 18.0 | -0.7 | 31.0 |
| Plan 2 | 2.0 | 0.7 | 19.0 | -0.6 | 35.2 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 42

Effects of Plan 2, Station 7, Bottom

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.4 | 0.6 |
| 1.0 | 0.7 | 1.2 |
| 2.0 | 0.9 | 1.6 |
| 3.0 | 1.0 | 1.6 |
| 4.0 | 0.9 | 1.6 |
| 5.0 | 1.0 | 1.4 |
| 6.0 | 0.9 | 1.4 |
| 7.0 | 1.1 | 1.4 |
| 8.0 | 0.9 | 1.4 |
| 9.0 | 0.8 | 1.1 |
| 10.0 | 0.6 | 1.0 |
| 11.0 | 0.4 | 0.8 |
| 12.0 | 0.3 | 0.6 |
| 13.0 | 0.3 | 0.2 |
| 14.0 | -0.3 | -0.5 |
| 15.0 | -0.5 | -0.8 |
| 16.0 | -0.7 | -0.8 |
| 17.0 | -0.8 | -0.8 |
| 18.0 | -0.7 | -0.7 |
| 19.0 | -0.8 | -0.6 |
| 20.0 | -0.6 | -0.4 |
| 21.0 | -0.4 | -0.5 |
| 22.0 | -0.4 | -0.2 |
| 23.0 | 0.3 | 0.1 |
| 24.0 | 0.3 | 0.2 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 7.0 | 1.1 | 17.0 | -0.8 | 32.8 |
| Plan 2 | 2.0 | 1.6 | 15.0 | -0.8 | 24.6 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 43

Effects of Plan 2, Station 8, Surface

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | -2.0 | -1.7 |
| 1.0 | -1.8 | -1.2 |
| 2.0 | -1.1 | -1.1 |
| 3.0 | -0.6 | -1.0 |
| 4.0 | -0.3 | -0.7 |
| 5.0 | 0.3 | -0.3 |
| 6.0 | 0.3 | 0.1 |
| 7.0 | 0.5 | 0.2 |
| 8.0 | 0.4 | 0.2 |
| 9.0 | 0.3 | 0.2 |
| 10.0 | 0.3 | 0.1 |
| 11.0 | 0.3 | -0.2 |
| 12.0 | -0.3 | -0.2 |
| 13.0 | -0.5 | -0.7 |
| 14.0 | -0.6 | -1.4 |
| 15.0 | -1.2 | -2.0 |
| 16.0 | -1.3 | -2.2 |
| 17.0 | -1.8 | -2.9 |
| 18.0 | -2.4 | -3.3 |
| 19.0 | -2.9 | -3.6 |
| 20.0 | -3.0 | -3.7 |
| 21.0 | -3.0 | -3.6 |
| 22.0 | -2.9 | -3.3 |
| 23.0 | -2.8 | -2.8 |
| 24.0 | -2.4 | -2.3 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 7.0 | 0.5 | 20.0 | -3.0 | 92.5 |
| Plan 2 | 7.0 | 0.2 | 20.0 | -3.7 | 98.0 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 44

Effects of Plan 2, Station 8, Bottom

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.9 | 1.1 |
| 1.0 | 1.1 | 1.4 |
| 2.0 | 1.2 | 1.4 |
| 3.0 | 1.4 | 1.5 |
| 4.0 | 1.2 | 1.4 |
| 5.0 | 1.2 | 1.5 |
| 6.0 | 1.2 | 1.4 |
| 7.0 | 1.2 | 1.3 |
| 8.0 | 1.1 | 1.0 |
| 9.0 | 1.1 | 0.8 |
| 10.0 | 0.9 | 0.6 |
| 11.0 | 0.7 | 0.4 |
| 12.0 | 0.3 | 0.2 |
| 13.0 | -0.3 | -0.2 |
| 14.0 | -0.3 | -0.4 |
| 15.0 | -0.6 | -0.4 |
| 16.0 | -0.8 | -0.3 |
| 17.0 | -0.7 | -0.3 |
| 18.0 | -0.8 | -0.2 |
| 19.0 | -0.6 | -0.2 |
| 20.0 | -0.5 | -0.2 |
| 21.0 | -0.3 | 0.2 |
| 22.0 | 0.3 | 0.2 |
| 23.0 | 0.3 | 0.3 |
| 24.0 | 0.6 | 0.6 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 3.0 | 1.4 | 16.0 | -0.8 | 25.5 |
| Plan 2 | 3.0 | 1.5 | 14.0 | -0.4 | 12.2 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 45

Effects of Plan 2, Station 9, Surface

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | -1.2 | -1.1 |
| 1.0 | -0.9 | -1.3 |
| 2.0 | -0.8 | -0.9 |
| 3.0 | -0.5 | -0.7 |
| 4.0 | -0.3 | -0.2 |
| 5.0 | -0.1 | 0.2 |
| 6.0 | 0.1 | 0.2 |
| 7.0 | 0.1 | 0.2 |
| 8.0 | 0.1 | 0.2 |
| 9.0 | 0.1 | 0.2 |
| 10.0 | 0.1 | 0.2 |
| 11.0 | 0.1 | 0.2 |
| 12.0 | 0.1 | 0.2 |
| 13.0 | -0.3 | -0.5 |
| 14.0 | -0.6 | -0.8 |
| 15.0 | -1.2 | -0.9 |
| 16.0 | -1.9 | -1.3 |
| 17.0 | -2.1 | -1.1 |
| 18.0 | -2.1 | -1.5 |
| 19.0 | -2.2 | -1.3 |
| 20.0 | -2.0 | -1.8 |
| 21.0 | -2.1 | -1.7 |
| 22.0 | -1.9 | -1.3 |
| 23.0 | -1.6 | -1.4 |
| 24.0 | -1.5 | -1.1 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 6.0 | 0.1 | 19.0 | -2.2 | 98.1 |
| Plan 2 | 5.0 | 0.2 | 20.0 | -1.8 | 92.1 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 46

Effects of Plan 2, Station 9, Bottom

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | 0.2 | 0.4 |
| 1.0 | 1.0 | 0.9 |
| 2.0 | 1.3 | 1.2 |
| 3.0 | 1.5 | 1.0 |
| 4.0 | 1.6 | 0.7 |
| 5.0 | 1.5 | 0.7 |
| 6.0 | 1.3 | 0.1 |
| 7.0 | 1.1 | 0.1 |
| 8.0 | 0.7 | 0.1 |
| 9.0 | 0.5 | -0.2 |
| 10.0 | 0.4 | -0.2 |
| 11.0 | 0.1 | -0.2 |
| 12.0 | 0.2 | -0.2 |
| 13.0 | -0.3 | -0.2 |
| 14.0 | -0.7 | -0.3 |
| 15.0 | -0.8 | -0.9 |
| 16.0 | -0.8 | -0.8 |
| 17.0 | -0.8 | -0.8 |
| 18.0 | -1.0 | -0.2 |
| 19.0 | -1.0 | -0.2 |
| 20.0 | -0.8 | -0.2 |
| 21.0 | -0.6 | -0.2 |
| 22.0 | -0.4 | -0.2 |
| 23.0 | 0.1 | 0.2 |
| 24.0 | 0.2 | 0.2 |

| Plan | Maximum Flood Time hr | Velocity fps | Maximum Ebb Time hr | Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 4.0 | 1.6 | 18.0 | -1.0 | 38.6 |
| Plan 2 | 2.0 | 1.2 | 15.0 | -0.9 | 46.2 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 47

Effects of Plan 2, Station 10, Surface

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | -1.0 | -1.0 |
| 1.0 | -0.7 | -0.6 |
| 2.0 | -0.2 | -0.3 |
| 3.0 | 0.1 | 0.1 |
| 4.0 | 0.1 | 0.2 |
| 5.0 | 0.2 | 0.3 |
| 6.0 | 0.2 | 0.4 |
| 7.0 | 0.3 | 0.5 |
| 8.0 | 0.7 | 0.7 |
| 9.0 | 0.7 | 0.9 |
| 10.0 | 0.6 | 0.9 |
| 11.0 | 0.5 | 0.4 |
| 12.0 | 0.1 | -0.2 |
| 13.0 | 0.1 | -0.5 |
| 14.0 | -0.9 | -1.3 |
| 15.0 | -1.5 | -1.9 |
| 16.0 | -2.0 | -2.4 |
| 17.0 | -2.3 | -2.5 |
| 18.0 | -2.3 | -2.8 |
| 19.0 | -2.2 | -2.6 |
| 20.0 | -2.2 | -2.5 |
| 21.0 | -2.0 | -2.3 |
| 22.0 | -1.9 | -1.7 |
| 23.0 | -1.6 | -1.4 |
| 24.0 | -1.4 | -1.1 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 8.0 | 0.7 | 17.0 | -2.3 | 86.3 |
| Plan 2 | 9.0 | 0.9 | 18.0 | -2.8 | 84.9 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 48

Effects of Plan 2, Station 10, Bottom

Q = 63,500 cfs

| Time hr* | Velocity, fps Base Test | Plan 2 |
|---|---|---|
| 0.0 | -0.1 | 0.2 |
| 1.0 | 0.1 | 0.2 |
| 2.0 | 0.2 | 0.3 |
| 3.0 | 0.2 | 0.5 |
| 4.0 | 0.1 | 0.3 |
| 5.0 | 0.1 | 0.3 |
| 6.0 | 0.1 | 0.3 |
| 7.0 | 0.1 | 0.5 |
| 8.0 | 0.1 | 0.5 |
| 9.0 | 0.1 | 0.3 |
| 10.0 | 0.1 | -0.2 |
| 11.0 | 0.1 | -0.2 |
| 12.0 | 0.1 | -0.5 |
| 13.0 | 0.1 | -0.7 |
| 14.0 | -0.3 | -0.9 |
| 15.0 | -0.4 | -0.9 |
| 16.0 | -0.1 | -0.6 |
| 17.0 | -0.1 | 0.1 |
| 18.0 | -0.1 | 0.1 |
| 19.0 | -0.1 | 0.1 |
| 20.0 | -0.1 | 0.1 |
| 21.0 | -0.1 | 0.2 |
| 22.0 | -0.1 | 0.2 |
| 23.0 | -0.1 | 0.2 |
| 24.0 | -0.1 | 0.2 |

| Plan | Maximum Flood Time hr | Maximum Flood Velocity fps | Maximum Ebb Time hr | Maximum Ebb Velocity fps | % Total Flow Downstream |
|---|---|---|---|---|---|
| Base | 2.0 | 0.2 | 15.0 | -0.4 | 61.3 |
| Plan 2 | 3.0 | 0.5 | 14.0 | -0.9 | 45.7 |

* Time is expressed in hours after moon's transit of 88th meridian.

Table 49

Maximum, Average, and Minimum Salinities for Base and Plan 2, (Total Salts, ppt)

Total Freshwater Inflow = 63,500 cfs

| Station No. | Depth | Maximum Base | Maximum Plan 2 | Average Base | Average Plan 2 | Minimum Base | Minimum Plan 2 |
|---|---|---|---|---|---|---|---|
| | | | Channel Stations | | | | |
| 1 | Surface | 26.1 | 24.4 | 19.6 | 18.8 | 11.1 | 12.0 |
| | Bottom | 30.4 | 28.9 | 29.1 | 26.8 | 27.4 | 27.4 |
| 2 | Surface | 24.7 | 23.1 | 19.6 | 16.6 | 14.2 | 8.8 |
| | Bottom | 29.0 | 27.9 | 28.6 | 27.2 | 28.1 | 25.6 |
| 3 | Surface | 16.6 | 25.0 | 10.3 | 14.5 | 4.7 | 6.5 |
| | Bottom | 28.4 | 27.5 | 28.2 | 27.0 | 27.9 | 26.3 |
| 4 | Surface | 18.9 | 11.6 | 13.2 | 6.7 | 9.2 | 3.8 |
| | Bottom | 28.0 | 27.1 | 27.6 | 26.3 | 27.4 | 24.8 |
| 5 | Surface | 16.8 | 8.2 | 7.6 | 5.4 | 3.8 | 3.9 |
| | Bottom | 27.8 | 27.0 | 27.6 | 26.6 | 27.5 | 25.7 |
| 6 | Surface | 5.7 | 4.6 | 3.4 | 2.8 | 1.6 | 1.9 |
| | Bottom | 27.5 | 27.0 | 27.2 | 26.6 | 27.0 | 25.7 |
| 7 | Surface | 9.8 | 12.3 | 5.0 | 5.6 | 2.5 | 2.9 |
| | Bottom | 26.8 | 26.4 | 26.5 | 25.8 | 26.0 | 24.9 |
| 8 | Surface | 5.8 | 7.4 | 2.9 | 3.2 | 0.8 | 1.0 |
| | Bottom | 26.3 | 25.8 | 25.2 | 24.2 | 25.8 | 24.8 |
| 9 | Surface | 1.8 | 1.6 | 0.7 | 1.0 | 0.4 | 0.7 |
| | Bottom | 25.4 | 24.3 | 24.6 | 23.4 | 23.6 | 22.1 |
| 10 | Surface | 0.3 | 0.5 | 0.2 | 0.2 | 0.1 | 0.1 |
| | Bottom | 24.7 | 22.6 | 23.9 | 21.9 | 23.5 | 20.7 |
| 11 | Surface | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Bottom | 0.1 | 17.2 | 0.1 | 1.9 | 0.1 | 0.1 |
| 12 | Surface | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Bottom | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| 13 | Surface | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Bottom | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 14 | Surface | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Bottom | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

(Continued)

Table 49 (Continued)

| Station No. | Depth | Maximum Base | Maximum Plan 2 | Average Base | Average Plan 2 | Minimum Base | Minimum Plan 2 |
|---|---|---|---|---|---|---|---|
| | | | **Cedar Point Stations** | | | | |
| S4 | Surface | 30.3 | 29.8 | 18.1 | 18.1 | 10.8 | 13.4 |
| | Bottom | 30.3 | 29.8 | 20.8 | 19.7 | 12.5 | 13.7 |
| S7 | Surface | 30.2 | 29.3 | 17.7 | 18.6 | 10.2 | 11.7 |
| | Bottom | 30.3 | 29.4 | 20.4 | 20.4 | 12.7 | 14.6 |
| S10 | Surface | 30.2 | 29.9 | 17.7 | 19.6 | 10.9 | 12.7 |
| | Bottom | 30.3 | 28.8 | 21.7 | 22.5 | 15.6 | 17.4 |
| S12 | Surface | 28.5 | 27.1 | 17.6 | 18.4 | 11.7 | 12.6 |
| | Bottom | 30.3 | 29.9 | 26.5 | 28.1 | 19.5 | 23.3 |
| S14 | Surface | 23.8 | 23.6 | 16.5 | 17.4 | 12.3 | 11.9 |
| | Bottom | 29.8 | 28.5 | 18.9 | 19.9 | 13.4 | 14.6 |
| | | | **Bay Stations** | | | | |
| M1 | Surface | 1.1 | 2.1 | 0.6 | 0.7 | 0.3 | 0.2 |
| | Bottom | 1.2 | 2.1 | 0.6 | 0.8 | 0.3 | 0.2 |
| M2 | Surface | 5.8 | 7.8 | 3.8 | 4.9 | 2.4 | 3.3 |
| | Bottom | 7.0 | 9.0 | 5.6 | 7.4 | 4.3 | 5.9 |
| M3 | Surface | 2.9 | 4.0 | 1.8 | 2.2 | 0.7 | 1.1 |
| | Bottom | 3.6 | 5.2 | 2.3 | 3.2 | 1.3 | 1.5 |
| M4 | Surface | 20.6 | 21.7 | 12.5 | 15.3 | 7.0 | 11.7 |
| | Bottom | 21.8 | 22.2 | 16.8 | 16.8 | 11.0 | 13.7 |
| M5 | Surface | 19.3 | 13.5 | 12.2 | 10.4 | 4.7 | 8.4 |
| | Bottom | 24.0 | 17.6 | 22.2 | 14.6 | 20.6 | 11.5 |
| M6 | Surface | 2.8 | 4.7 | 1.9 | 2.8 | 1.2 | 1.5 |
| | Bottom | 5.3 | 13.4 | 4.2 | 6.8 | 2.8 | 2.9 |
| M7 | Surface | -- | 3.4 | -- | 1.6 | -- | 1.0 |
| | Bottom | -- | 4.4 | -- | 2.8 | -- | 1.6 |
| M8 | Surface | 1.3 | 1.3 | 0.9 | 0.8 | 0.5 | 0.6 |
| | Bottom | 1.3 | 1.4 | 1.0 | 0.9 | 0.5 | 0.6 |
| M9 | Surface | 11.2 | 14.3 | 8.0 | 9.2 | 5.8 | 6.3 |
| | Bottom | 11.9 | 14.3 | 9.8 | 11.1 | 7.6 | 8.7 |
| M10 | Surface | 11.5 | 13.1 | 6.2 | 7.5 | 3.2 | 4.8 |
| | Bottom | 11.7 | 13.4 | 9.7 | 11.5 | 7.5 | 9.8 |

(Continued)

Table 49 (Concluded)

| Station No. | Depth | Maximum Base | Maximum Plan 2 | Average Base | Average Plan 2 | Minimum Base | Minimum Plan 2 |
|---|---|---|---|---|---|---|---|
| | | **Bay Stations (Continued)** | | | | | |
| M11 | Surface | 5.4 | 7.7 | 3.7 | 4.4 | 1.8 | 2.2 |
| | Bottom | 11.8 | 10.0 | 8.4 | 6.3 | 4.3 | 4.2 |
| M12 | Surface | 5.6 | 5.4 | 2.1 | 3.1 | 1.4 | 1.6 |
| | Bottom | 6.4 | 6.4 | 3.2 | 4.3 | 1.6 | 1.6 |
| M13 | Surface | 11.9 | 10.7 | 6.4 | 6.7 | 4.3 | 4.1 |
| | Bottom | 22.2 | 20.3 | 17.4 | 12.5 | 9.2 | 6.1 |
| M14 | Surface | 8.2 | 8.4 | 4.1 | 5.4 | 2.3 | 3.2 |
| | Bottom | 16.6 | 11.3 | 15.1 | 9.1 | 14.1 | 5.4 |
| M15 | Surface | 13.2 | 15.6 | 10.8 | 13.3 | 8.7 | 8.9 |
| | Bottom | 17.7 | 16.7 | 14.5 | 15.0 | 12.0 | 13.1 |
| M16 | Surface | 18.3 | 16.7 | 9.5 | 11.5 | 3.7 | 4.9 |
| | Bottom | 23.0 | 22.8 | 17.1 | 13.8 | 10.9 | 4.9 |
| M17 | Surface | 19.4 | 11.3 | 11.8 | 8.3 | 5.2 | 5.9 |
| | Bottom | 26.0 | 23.4 | 22.8 | 19.3 | 17.1 | 13.1 |
| M18 | Surface | 18.3 | 11.3 | 13.3 | 8.5 | 10.6 | 6.1 |
| | Bottom | 23.5 | 18.0 | 22.6 | 16.6 | 21.5 | 14.2 |
| M19 | Surface | 15.8 | 16.3 | 13.2 | 13.1 | 7.8 | 7.5 |
| | Bottom | 22.2 | 27.3 | 20.6 | 20.4 | 17.3 | 16.7 |
| M20 | Surface | 21.3 | 22.2 | 11.7 | 14.6 | 7.9 | 9.3 |
| | Bottom | 26.3 | 24.1 | 22.8 | 20.7 | 17.6 | 17.3 |
| M21 | Surface | 23.9 | 22.2 | 19.8 | 16.7 | 14.8 | 10.9 |
| | Bottom | 27.6 | 27.5 | 26.2 | 25.2 | 23.6 | 22.3 |
| M22 | Surface | 22.2 | 19.2 | 19.0 | 15.5 | 13.3 | 12.6 |
| | Bottom | 26.1 | 23.6 | 24.8 | 21.7 | 24.1 | 19.1 |
| M23 | Surface | 23.7 | 17.9 | 20.2 | 17.4 | 18.0 | 16.4 |
| | Bottom | 29.8 | 29.0 | 29.4 | 28.0 | 27.6 | 26.8 |
| M24 | Surface | 4.6 | 5.8 | 3.2 | 4.3 | 2.1 | 3.2 |
| | Bottom | 11.9 | 11.9 | 5.7 | 6.8 | 2.6 | 4.6 |
| M25 | Surface | 13.3 | 15.7 | 10.7 | 12.8 | 7.3 | 7.7 |
| | Bottom | 15.8 | 17.8 | 12.5 | 14.2 | 8.9 | 11.3 |
| M26 | Surface | 26.6 | 18.9 | 19.2 | 12.6 | 9.9 | 7.9 |
| | Bottom | 26.7 | 24.1 | 23.4 | 18.3 | 20.0 | 13.5 |
| M27 | Surface | 19.7 | 15.3 | 17.4 | 14.1 | 14.2 | 12.8 |
| | Bottom | 27.0 | 22.9 | 25.3 | 21.0 | 23.0 | 18.9 |

Table 50

Effects of Plan 2 on Average Salinities (Total Salts, ppt)
for Critical Areas 1, 2, 3, and 4
Total Freshwater Inflow = 63,500 cfs

| | Station | Depth | Base | Plan 2 | Difference* |
|---|---|---|---|---|---|
| Area 1 (South of Channel) | M9 | Surface | 8.0 | 9.2 | |
| | | Bottom | 9.8 | 11.1 | |
| | M10 | Surface | 6.2 | 7.5 | |
| | | Bottom | 9.7 | 11.5 | |
| | M25 | Surface | 10.7 | 12.8 | |
| | | Bottom | 12.5 | 14.2 | |
| | Area Average | Surface | 8.3 | 9.8 | +1.5 |
| | | Bottom | 10.7 | 12.3 | +1.6 |
| | | Average | 9.5 | 11.1 | +1.6 |
| Area 2 (Whitehouse) | M4 | Surface | 12.5 | 15.3 | |
| | | Bottom | 16.8 | 16.8 | |
| | M15 | Surface | 10.8 | 13.3 | |
| | | Bottom | 14.5 | 15.0 | |
| | M16 | Surface | 9.5 | 11.5 | |
| | | Bottom | 17.1 | 13.8 | |
| | M19 | Surface | 13.2 | 13.1 | |
| | | Bottom | 20.6 | 20.4 | |
| | M20 | Surface | 11.7 | 14.6 | |
| | | Bottom | 22.8 | 20.7 | |
| | Area Average | Surface | 11.5 | 13.6 | +2.1 |
| | | Bottom | 18.4 | 17.3 | -1.1 |
| | | Average | 15.0 | 15.5 | +0.5 |
| Area 3 (Cedar Point) | S4 | Surface | 18.1 | 18.1 | |
| | | Bottom | 20.8 | 19.7 | |
| | S7 | Surface | 17.7 | 18.6 | |
| | | Bottom | 20.4 | 20.4 | |
| | S10 | Surface | 17.7 | 19.6 | |
| | | Bottom | 21.7 | 22.5 | |

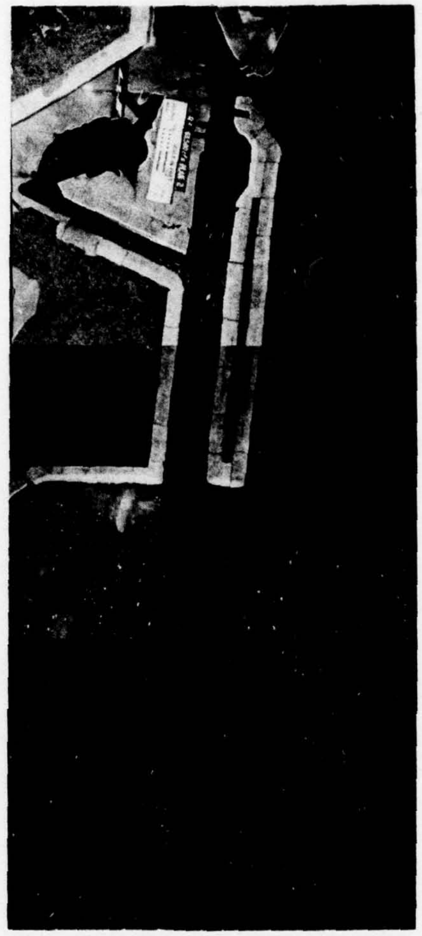
(Continued)

* Plan value minus base value.

Table 50 (Concluded)

| | Station | Depth | Base | Plan 2 | Difference |
|---|---|---|---|---|---|
| Area 3 (Continued) (Cedar Point) | S12 | Surface | 17.6 | 18.4 | |
| | | Bottom | 26.5 | 28.1 | |
| | S14 | Surface | 16.5 | 17.4 | |
| | | Bottom | 18.9 | 19.9 | |
| | Area Average | Surface | 17.5 | 18.4 | +0.9 |
| | | Bottom | 21.7 | 22.1 | +0.4 |
| | | Average | 19.6 | 20.3 | +0.7 |
| Area 4 (Klondike) | M11 | Surface | 3.7 | 4.4 | |
| | | Bottom | 8.4 | 6.3 | |
| | M12 | Surface | 2.1 | 3.1 | |
| | | Bottom | 3.2 | 4.3 | |
| | M13 | Surface | 6.4 | 6.7 | |
| | | Bottom | 17.4 | 12.5 | |
| | M14 | Surface | 4.1 | 5.4 | |
| | | Bottom | 15.1 | 9.1 | |
| | M24 | Surface | 3.2 | 4.3 | |
| | | Bottom | 5.7 | 6.8 | |
| | Area Average | Surface | 3.9 | 4.8 | +0.9 |
| | | Bottom | 10.0 | 7.8 | -2.2 |
| | | Average | 7.0 | 6.3 | -0.7 |

PLAN 7

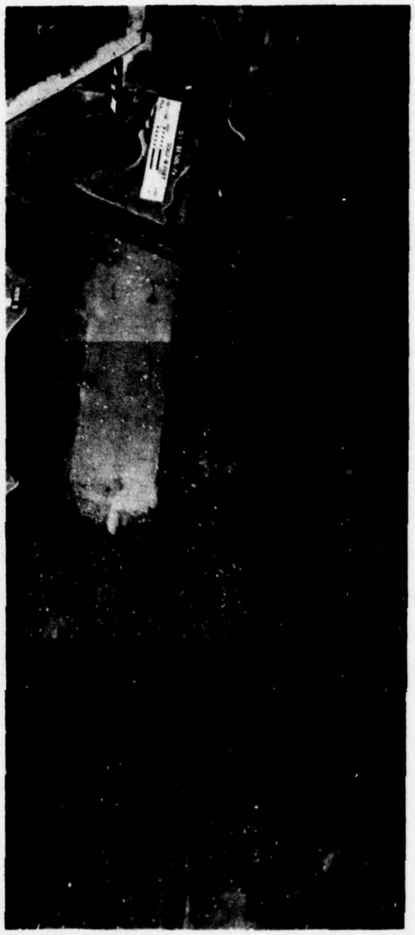


PLAN 2

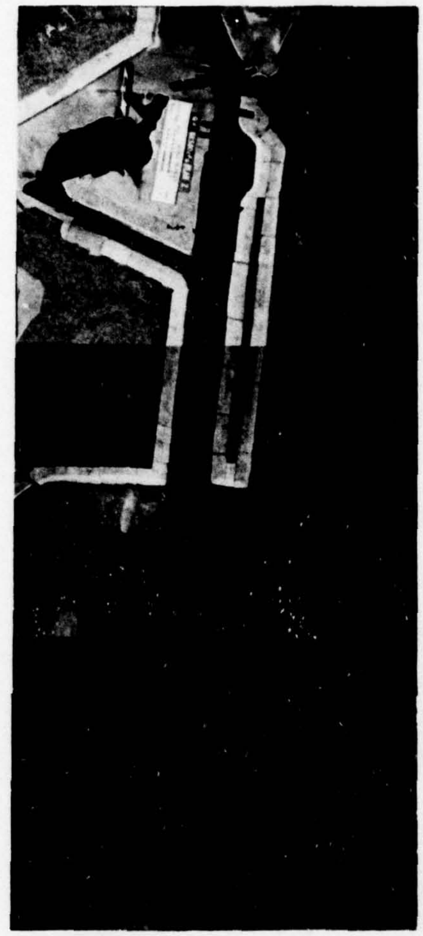
VELOCITY SCALE
5 0 5 10 FPS

EFFECTS OF PLAN 2 DISPOSAL AREAS ON SURFACE CURRENTS
MEAN INFLOW (63,500 CFS)
HOUR 4

PHOTO 1



PLAN 7



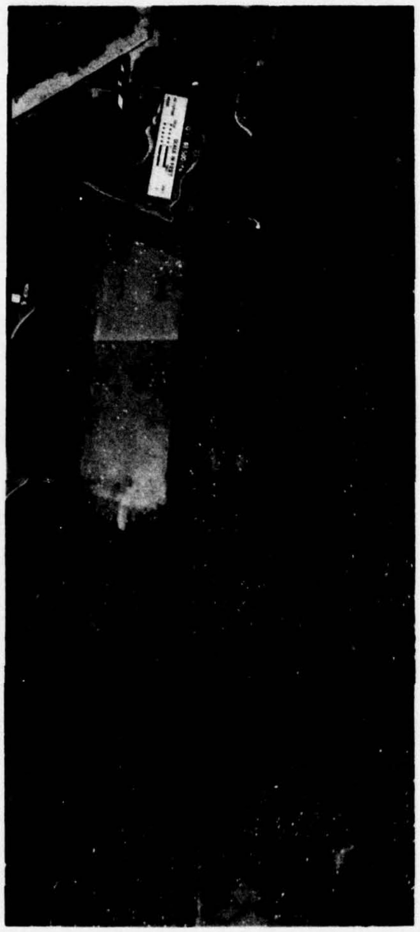
PLAN 2

VELOCITY SCALE

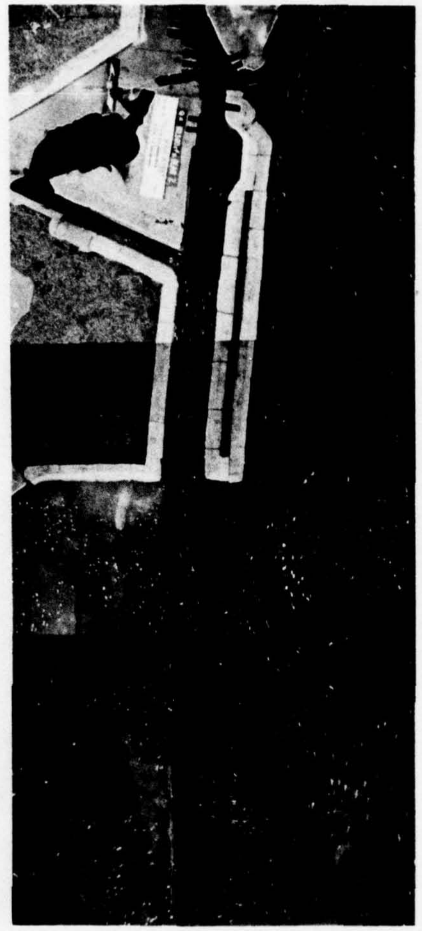
5 0 5 10 FPS

EFFECTS OF PLAN 2 DISPOSAL
AREAS ON SURFACE CURRENTS
MEAN INFLOW (63,500 CFS)
HOUR 5

PHOTO 2



PLAN 7



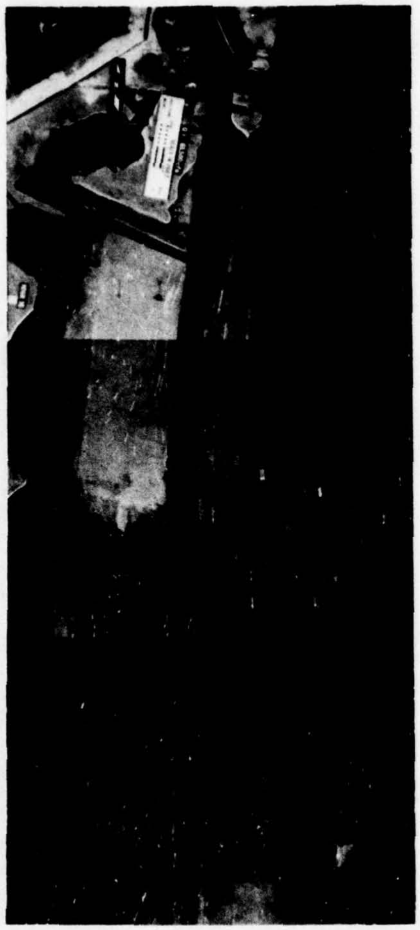
PLAN 2

VELOCITY SCALE

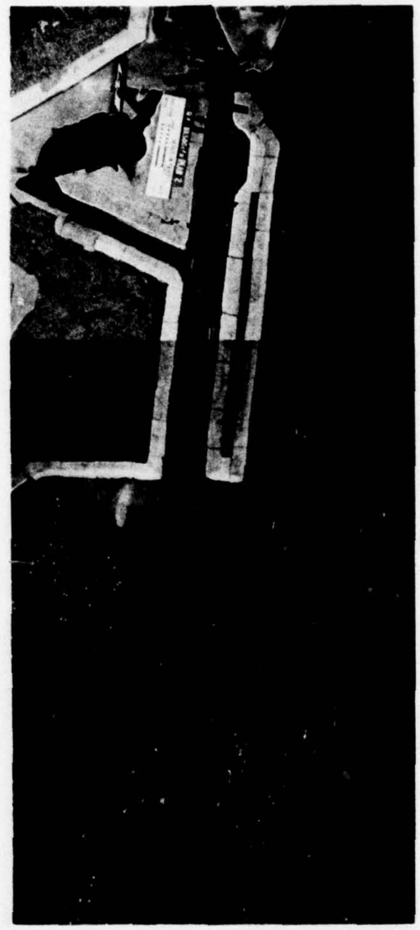
5 0 5 10 FPS

EFFECTS OF PLAN 2 DISPOSAL
AREAS ON SURFACE CURRENTS
MEAN INFLOW (63,500 CFS)
HOUR 6

PHOTO 3



PLAN 7



PLAN 2

VELOCITY SCALE

5 0 5 10 FPS

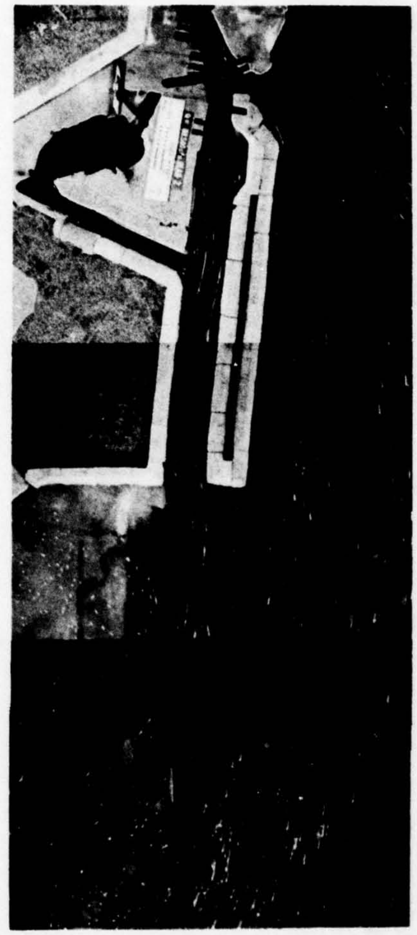
EFFECTS OF PLAN 2 DISPOSAL AREAS ON SURFACE CURRENTS

MEAN INFLOW (63,500 CFS)

HOUR 16

PHOTO 4

PLAN 7



PLAN 2

VELOCITY SCALE

5 0 5 10 FPS

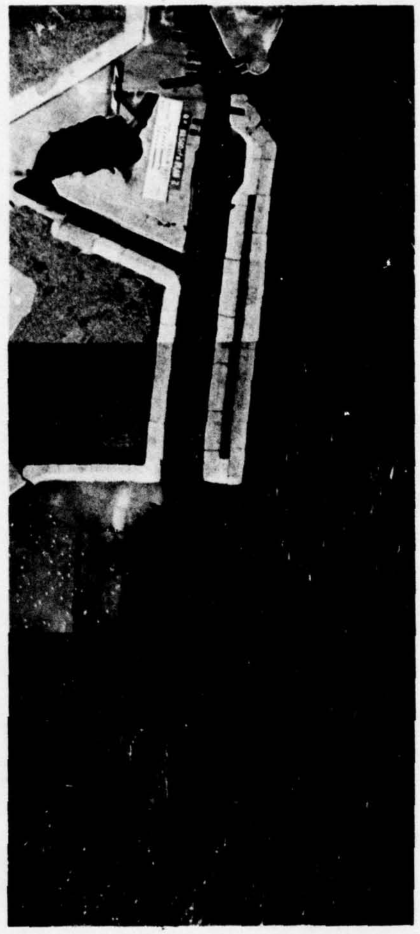
EFFECTS OF PLAN 2 DISPOSAL AREAS ON SURFACE CURRENTS

MEAN INFLOW (63,500 CFS)

HOUR 17

PHOTO 5

PLAN 7

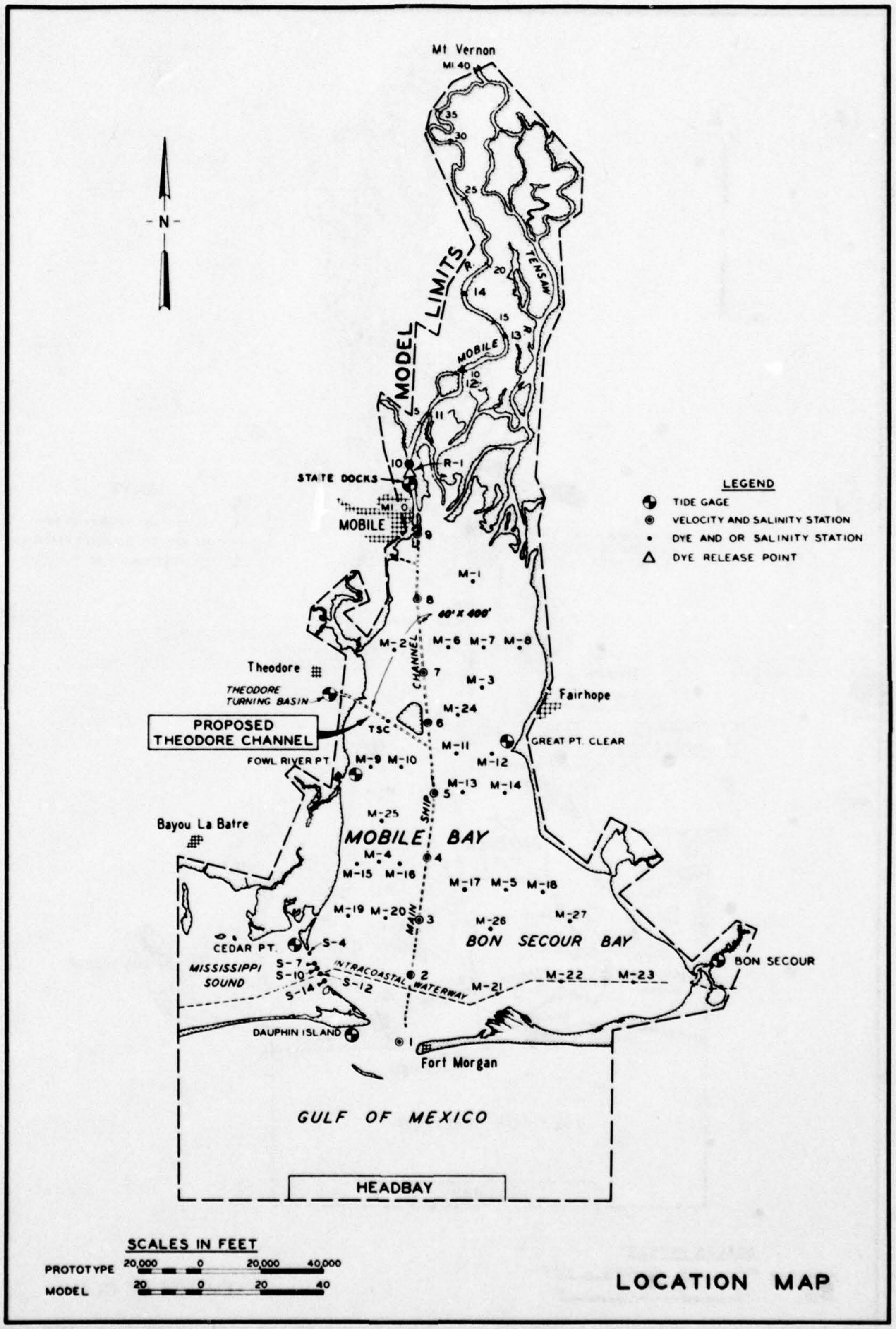


PLAN 2

VELOCITY SCALE
5 0 5 10 FPS

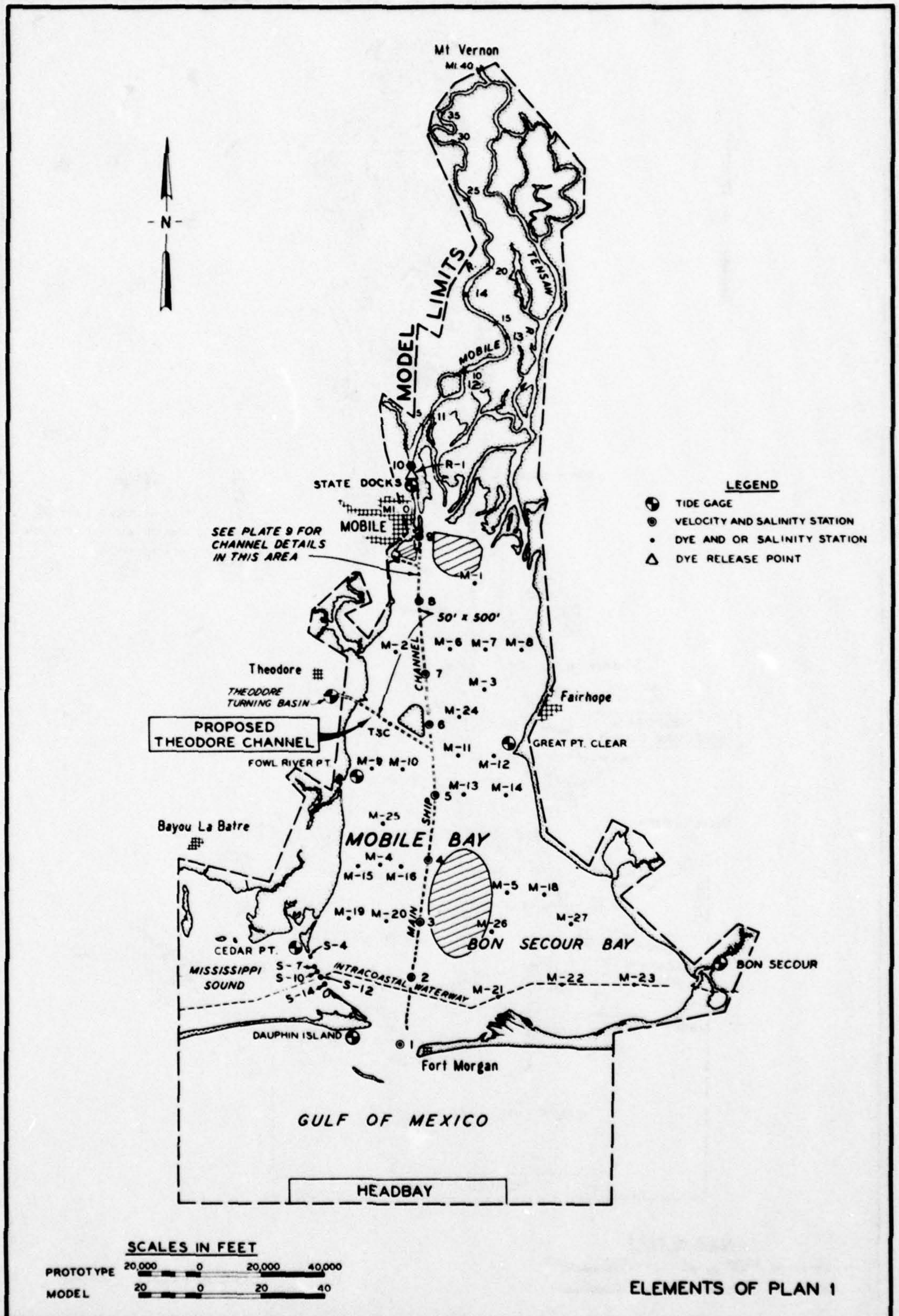
EFFECTS OF PLAN 2 DISPOSAL
AREAS ON SURFACE CURRENTS
MEAN INFLOW (63,500 CFS)
HOUR 18

PHOTO 6



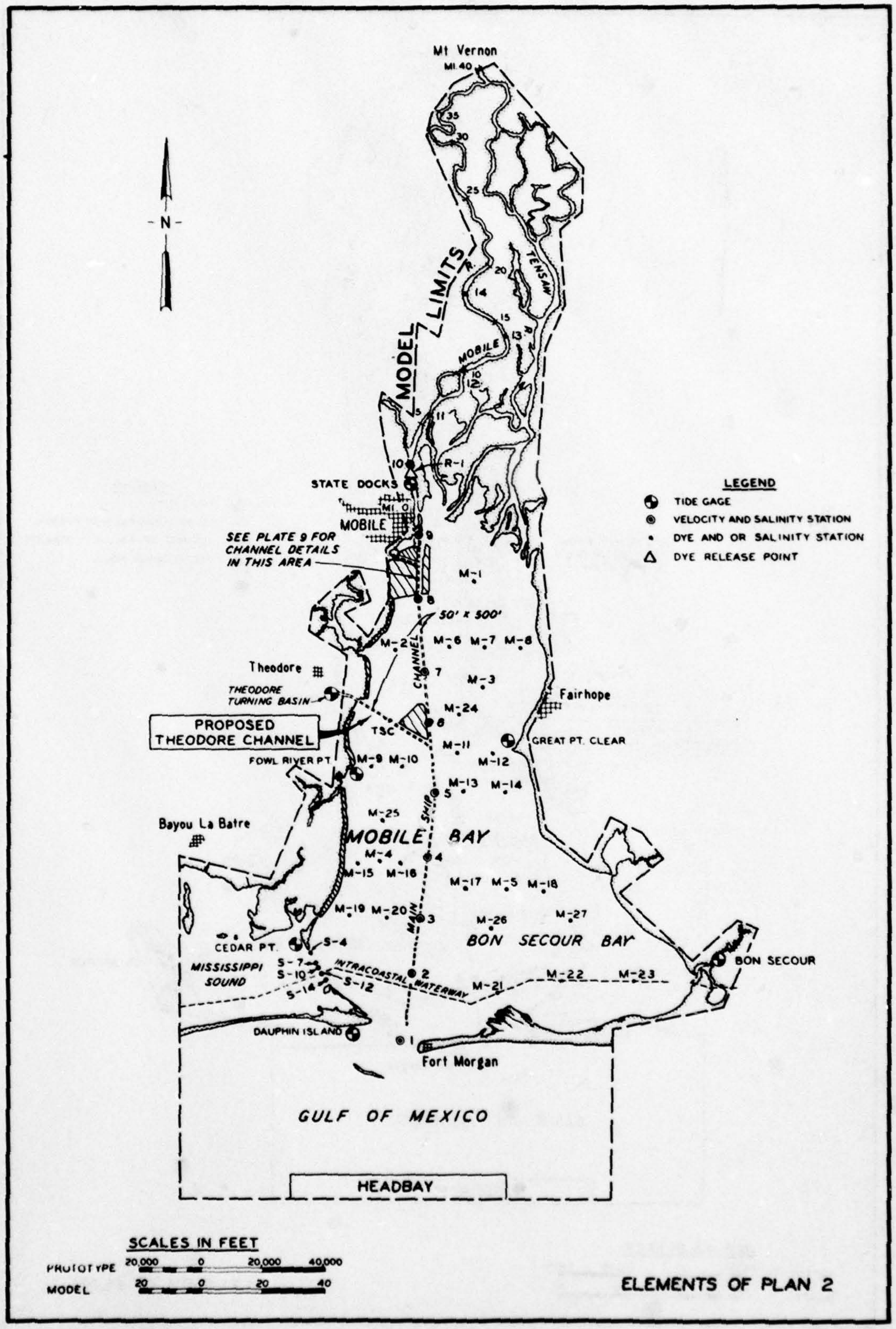

LOCATION MAP

PLATE 1



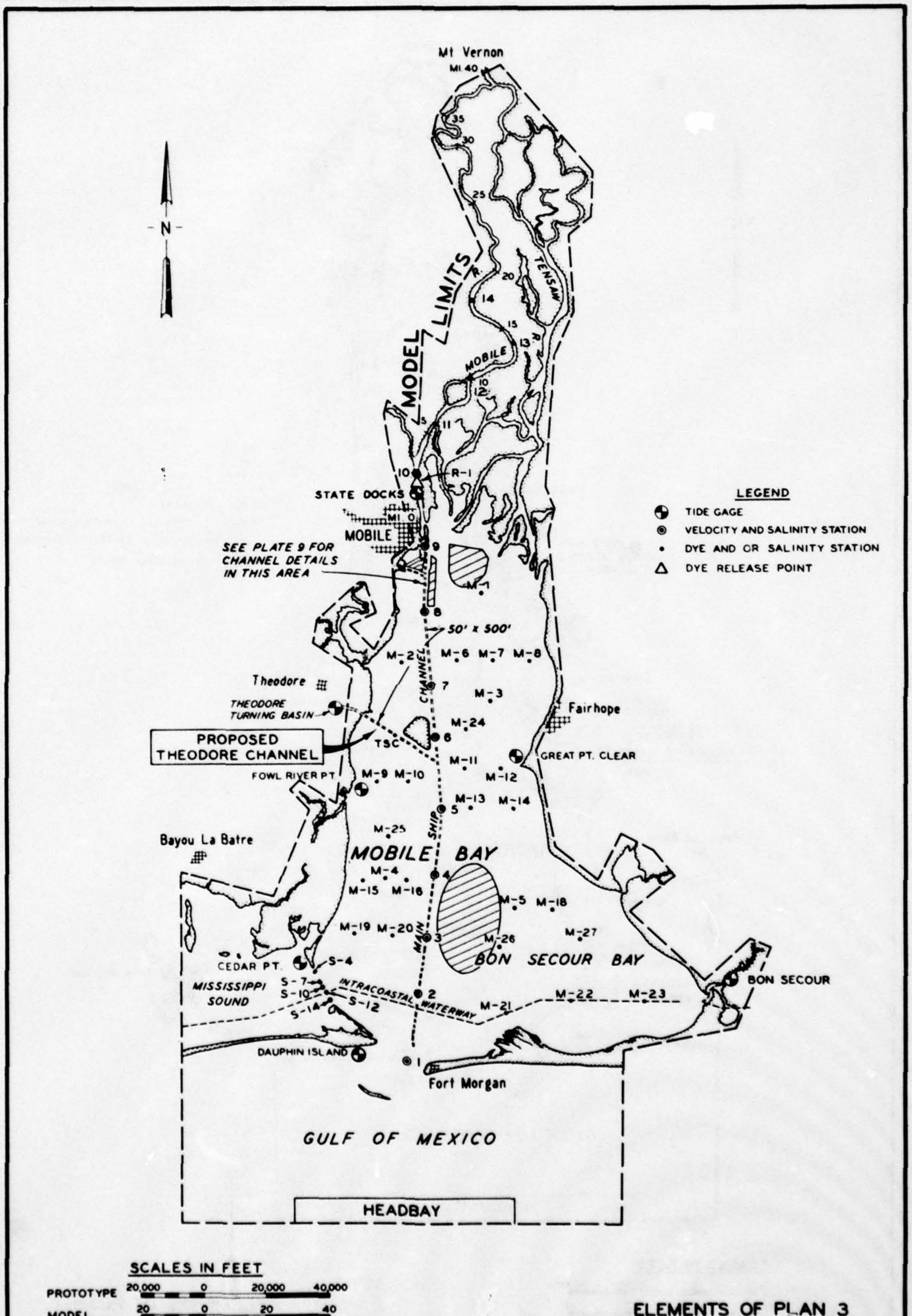

ELEMENTS OF PLAN 1

PLATE 2



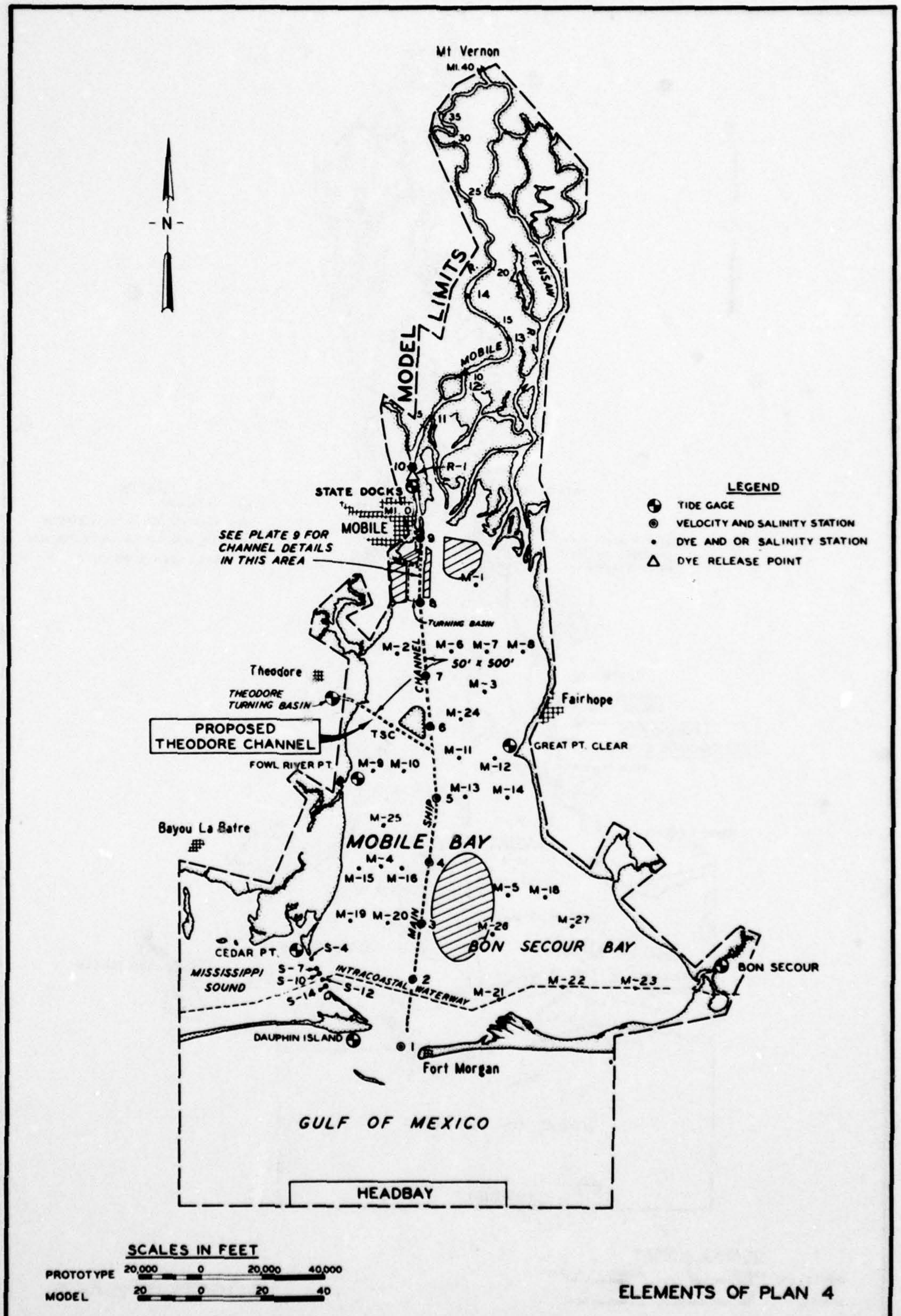
Mt Vernon
MI 40
35
30
25
20
14
15
13
10
12
11
5
TENSAW
R.
MOBILE
MODEL LIMITS
R-1
STATE DOCKS
MI 0
MOBILE
SEE PLATE 9 FOR CHANNEL DETAILS IN THIS AREA
LEGEND
TIDE GAGE
VELOCITY AND SALINITY STATION
DYE AND OR SALINITY STATION
DYE RELEASE POINT
9
8
M-1
50' x 500'
M-2
M-6
M-7
M-8
7
M-3
Theodore
THEODORE TURNING BASIN
M-24
Fairhope
6
PROPOSED THEODORE CHANNEL
TSC
M-11
GREAT PT. CLEAR
FOWL RIVER PT.
M-9
M-10
M-12
M-13
M-14
5
M-25
Bayou La Batre
MOBILE BAY
MAIN SHIP CHANNEL
M-4
4
M-15
M-16
M-17
M-5
M-18
M-19
M-20
3
M-26
M-27
BON SECOUR BAY
CEDAR PT.
S-4
S-7
S-10
S-12
S-14
MISSISSIPPI SOUND
INTRACOASTAL WATERWAY
2
M-21
M-22
M-23
BON SECOUR
DAUPHIN ISLAND
1
Fort Morgan
GULF OF MEXICO
HEADBAY
SCALES IN FEET
PROTOTYPE 20,000 0 20,000 40,000
MODEL 20 0 20 40
ELEMENTS OF PLAN 2


PLATE 3




ELEMENTS OF PLAN 3

PLATE 4




ELEMENTS OF PLAN 4

PLATE 5

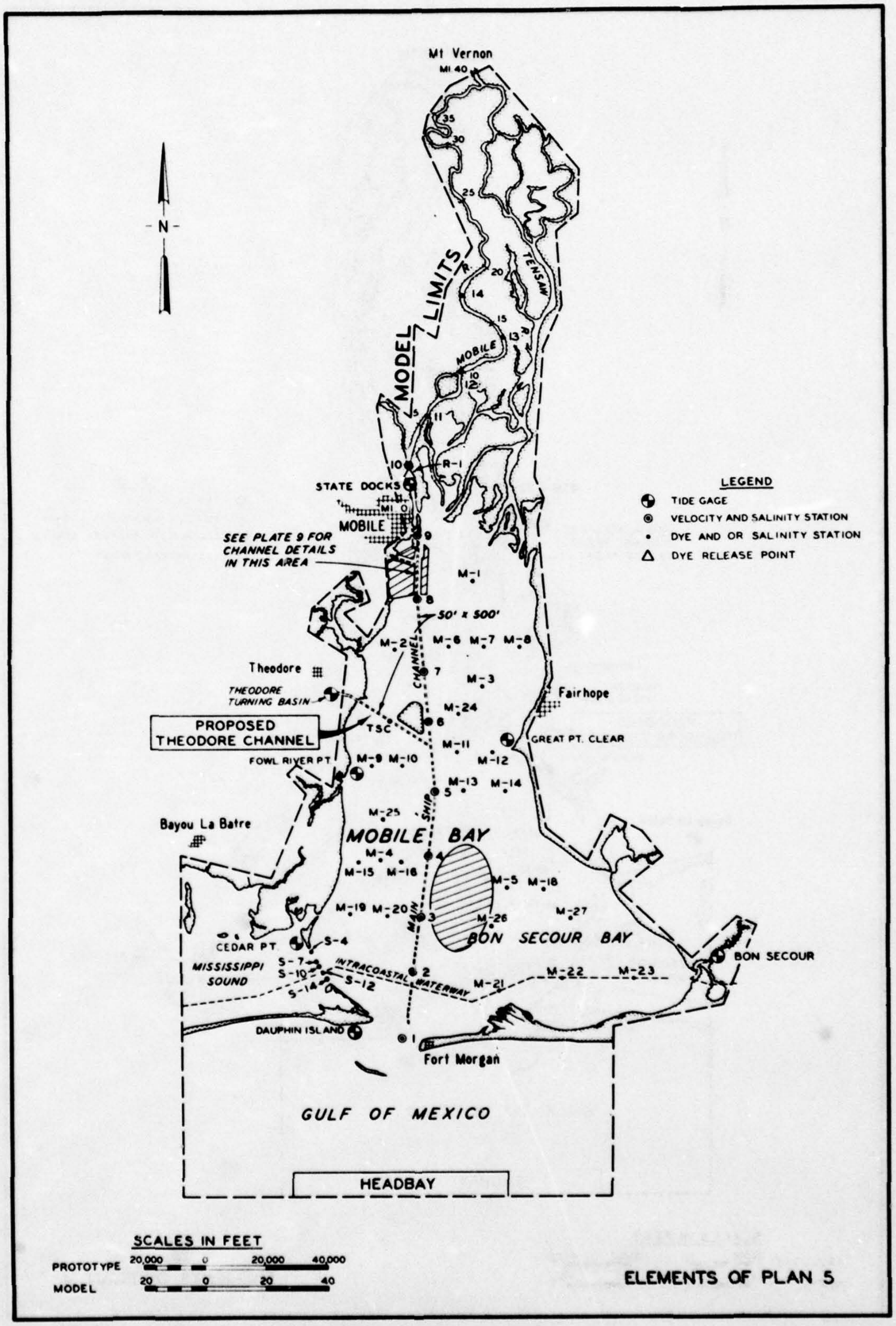
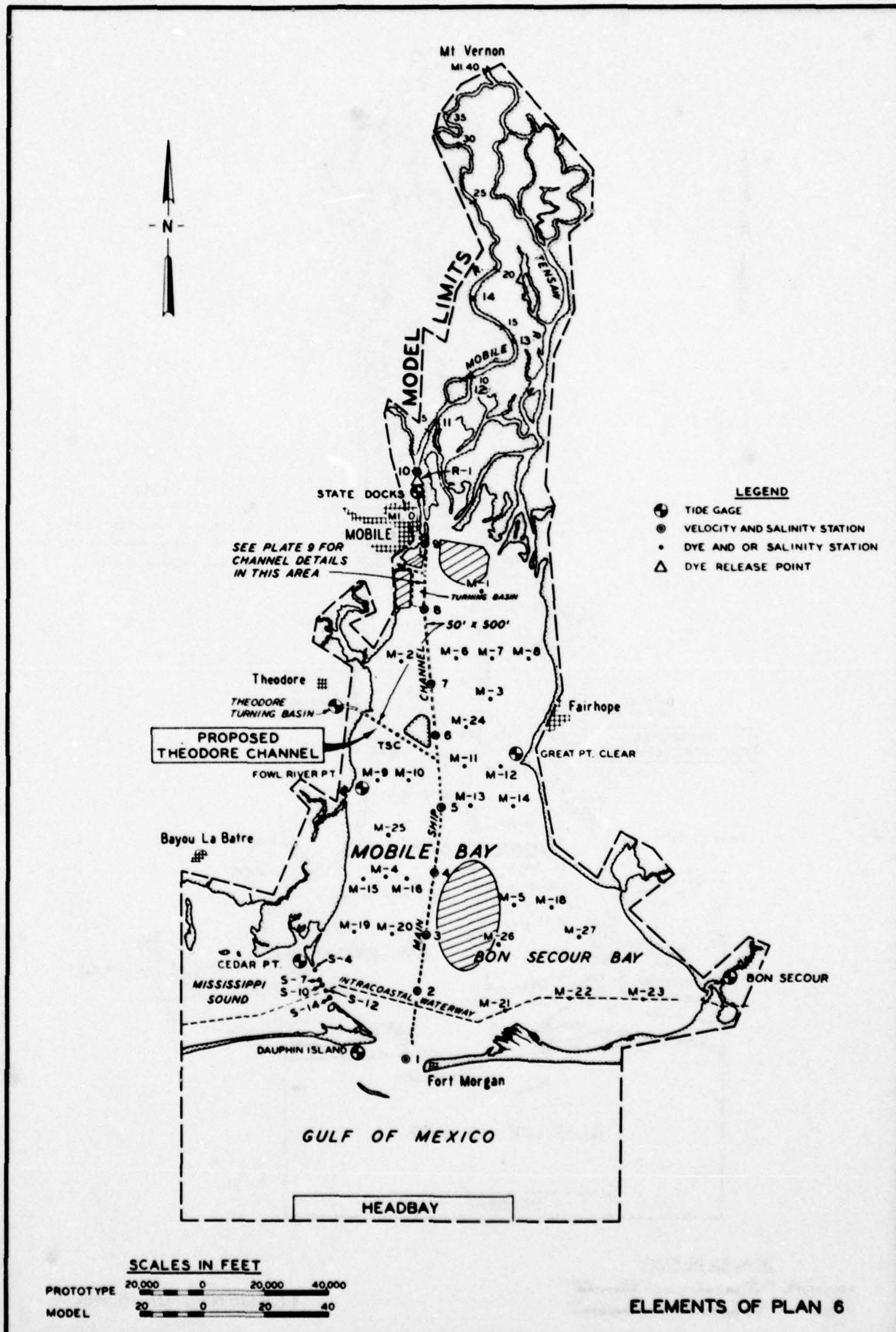
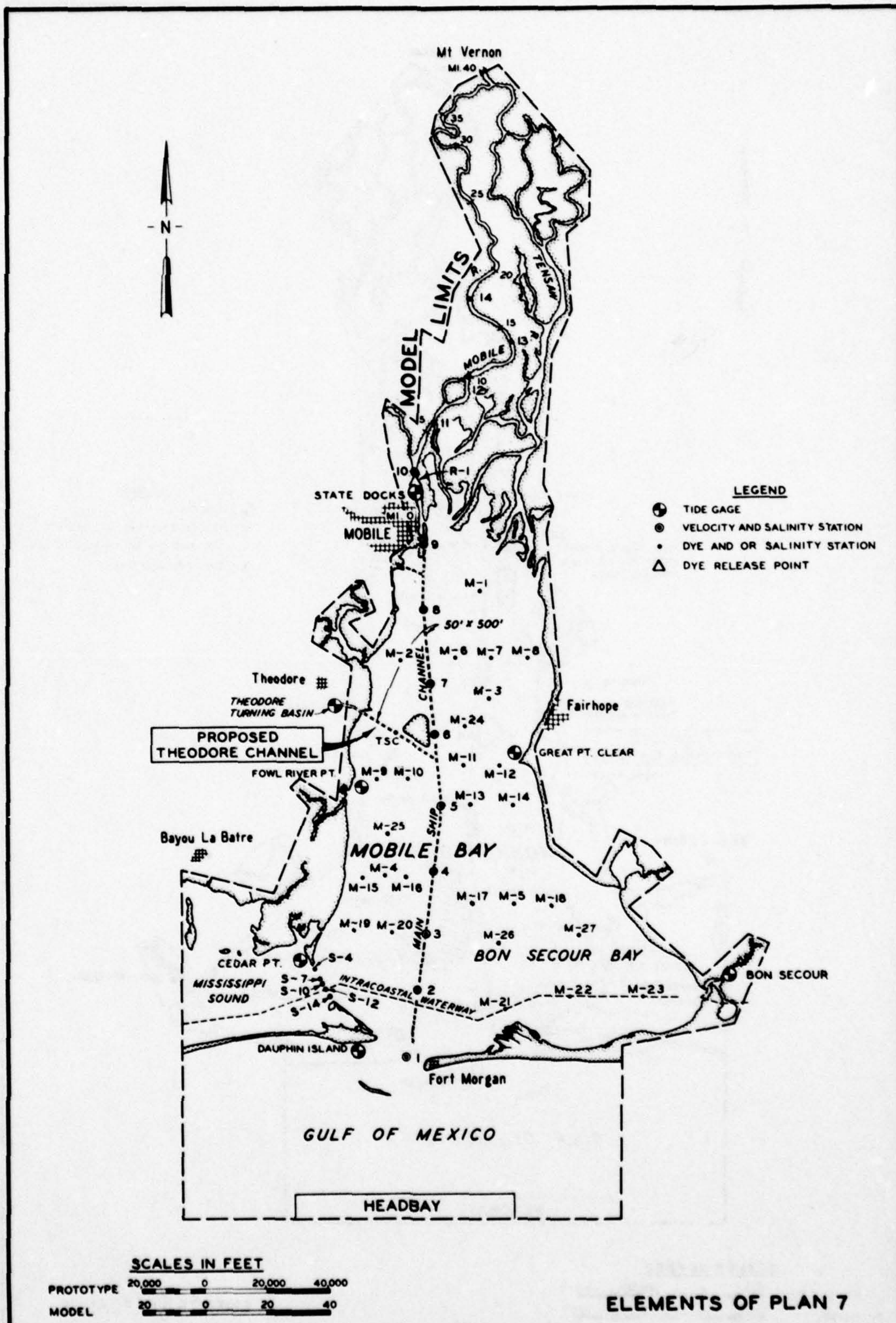

Mt Vernon
MODEL LIMITS
MOBILE R.
TENSAW R.
STATE DOCKS
MOBILE
SEE PLATE 9 FOR CHANNEL DETAILS IN THIS AREA
50' x 500'
Theodore
THEODORE TURNING BASIN
PROPOSED THEODORE CHANNEL
TSC
FOWL RIVER PT
Fairhope
GREAT PT. CLEAR
Bayou La Batre
MOBILE BAY
MAIN SHIP CHANNEL
BON SECOUR BAY
CEDAR PT.
MISSISSIPPI SOUND
INTRACOASTAL WATERWAY
BON SECOUR
DAUPHIN ISLAND
Fort Morgan
GULF OF MEXICO
HEADBAY
LEGEND
TIDE GAGE
VELOCITY AND SALINITY STATION
DYE AND OR SALINITY STATION
DYE RELEASE POINT
SCALES IN FEET
PROTOTYPE 20,000 0 20,000 40,000
MODEL 20 0 20 40
ELEMENTS OF PLAN 5

PLATE 6

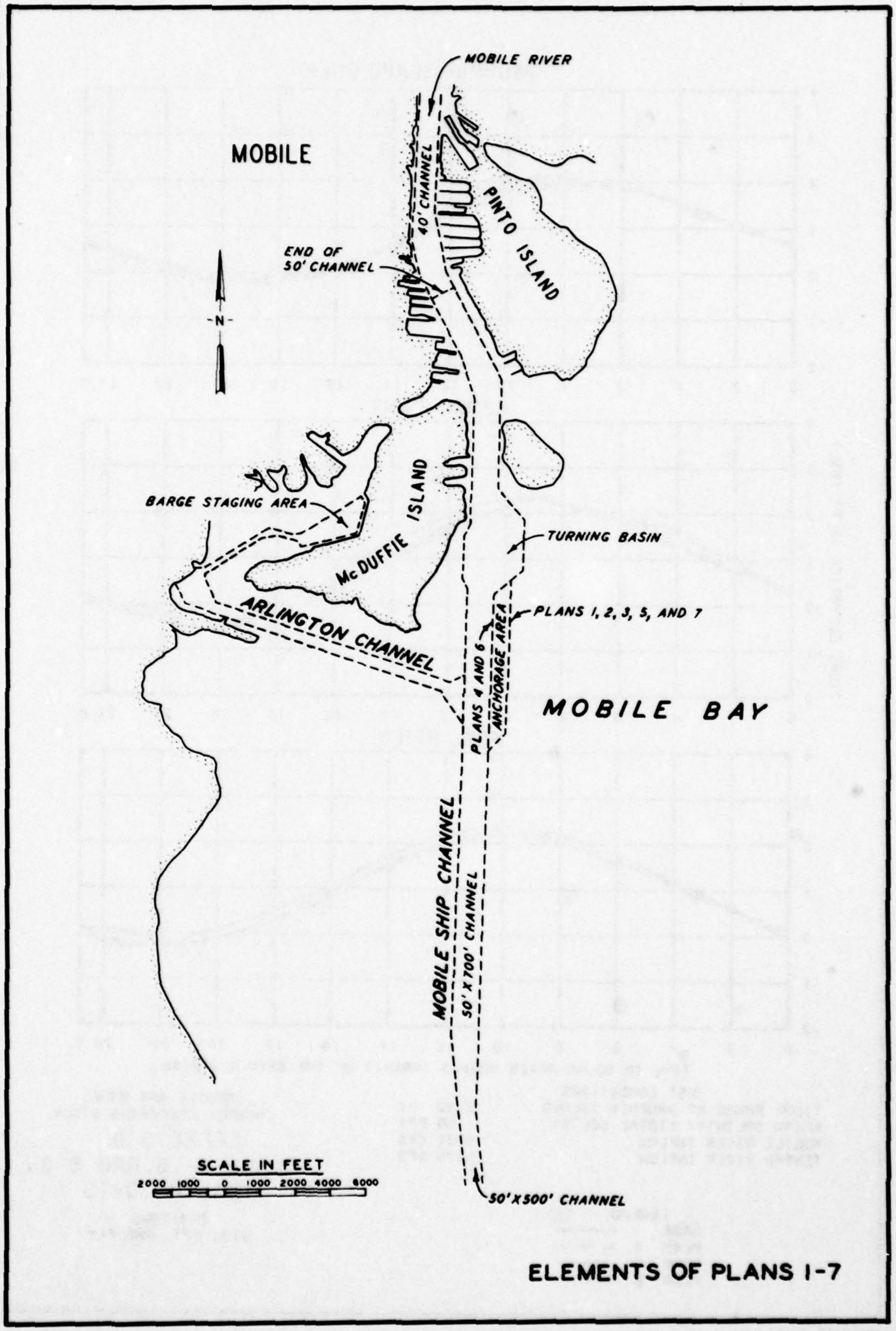



ELEMENTS OF PLAN 6

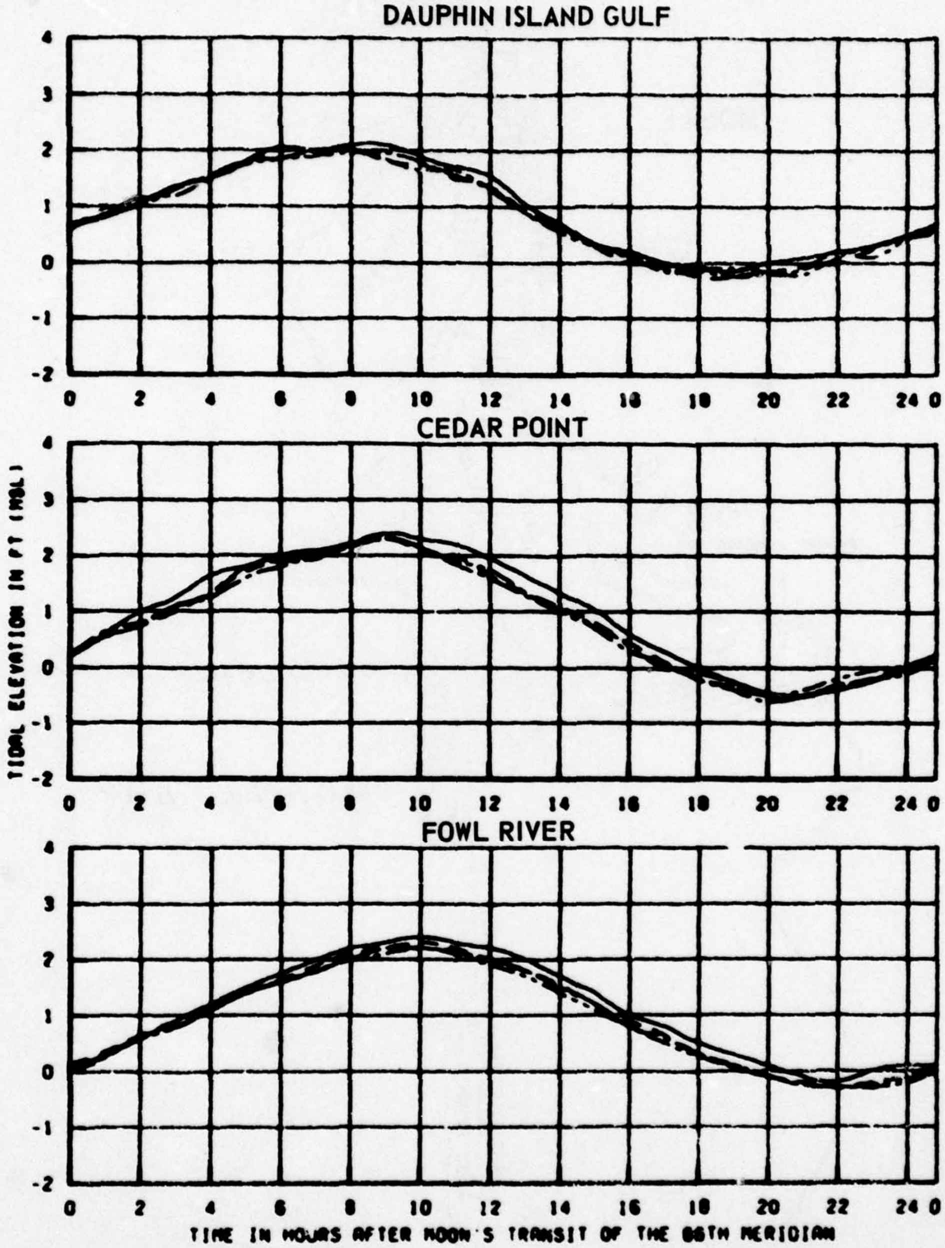



ELEMENTS OF PLAN 7

PLATE 8




ELEMENTS OF PLANS 1-7




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND

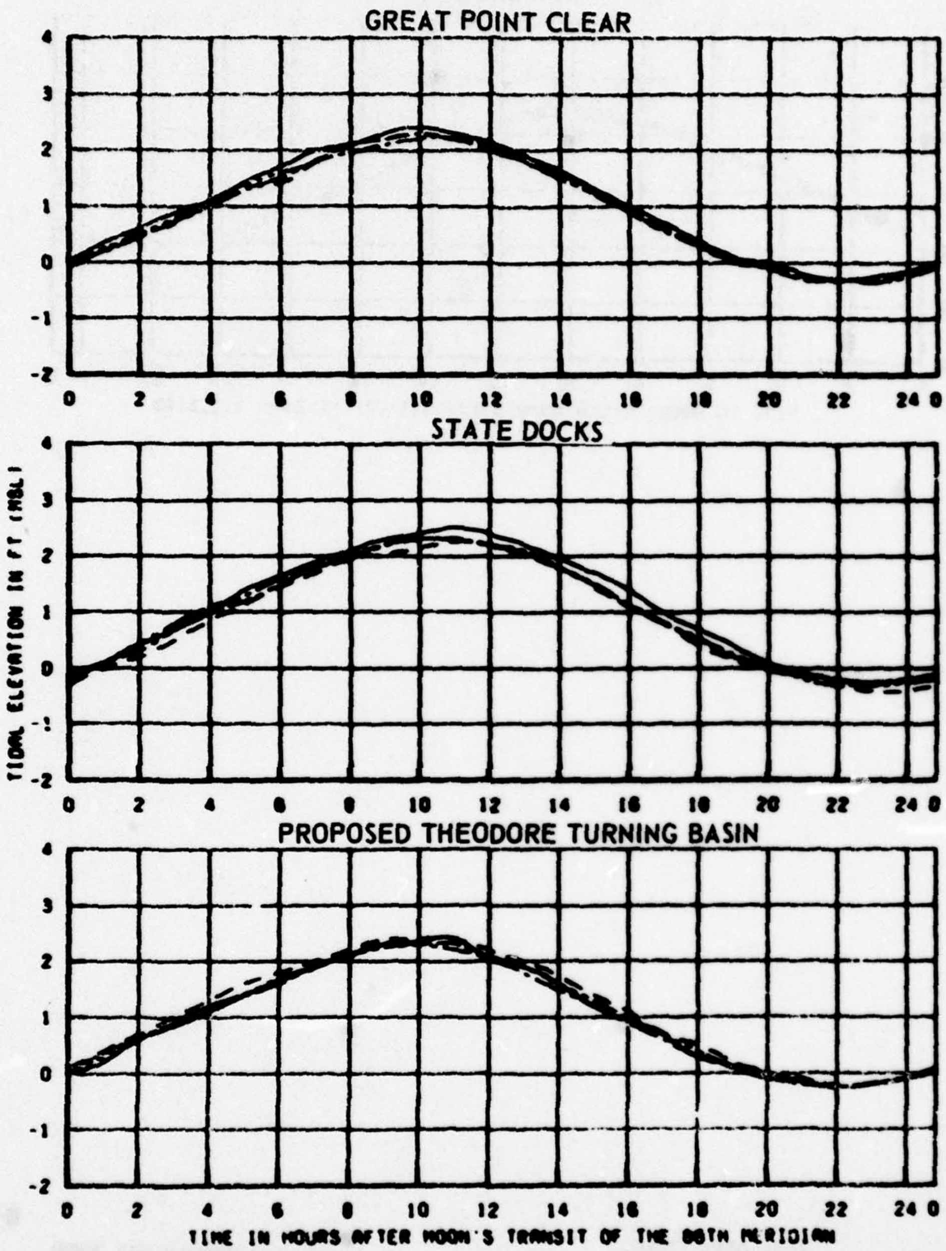
BASE ———
PLAN 4 — — —
PLAN 5 —·—
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 4, 5, AND 6 ON
TIDAL HEIGHTS

STATIONS
DIG. CPT. AND FLR

PLATE 10




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND

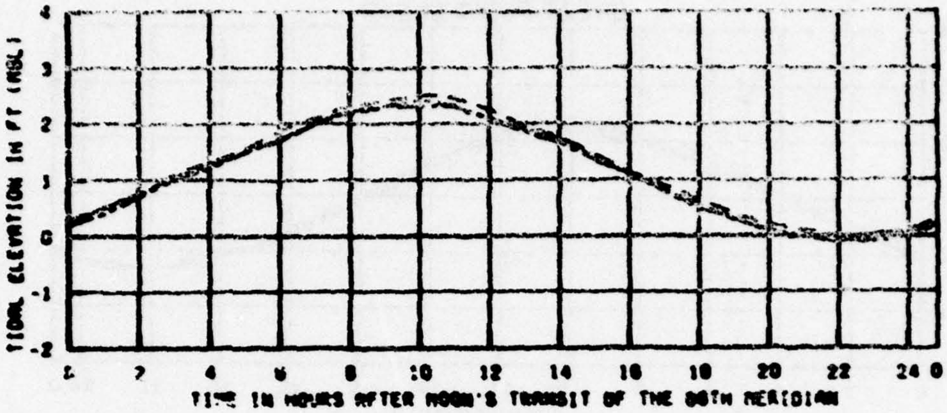
BASE ———
PLAN 1 — — —
PLAN 2 —·—·—
PLAN 3 —··—··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 1, 2, AND 3 ON
TIDAL HEIGHTS

STATIONS
GPC, SD, AND TB

BON SECOUR




| TEST CONDITIONS | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND

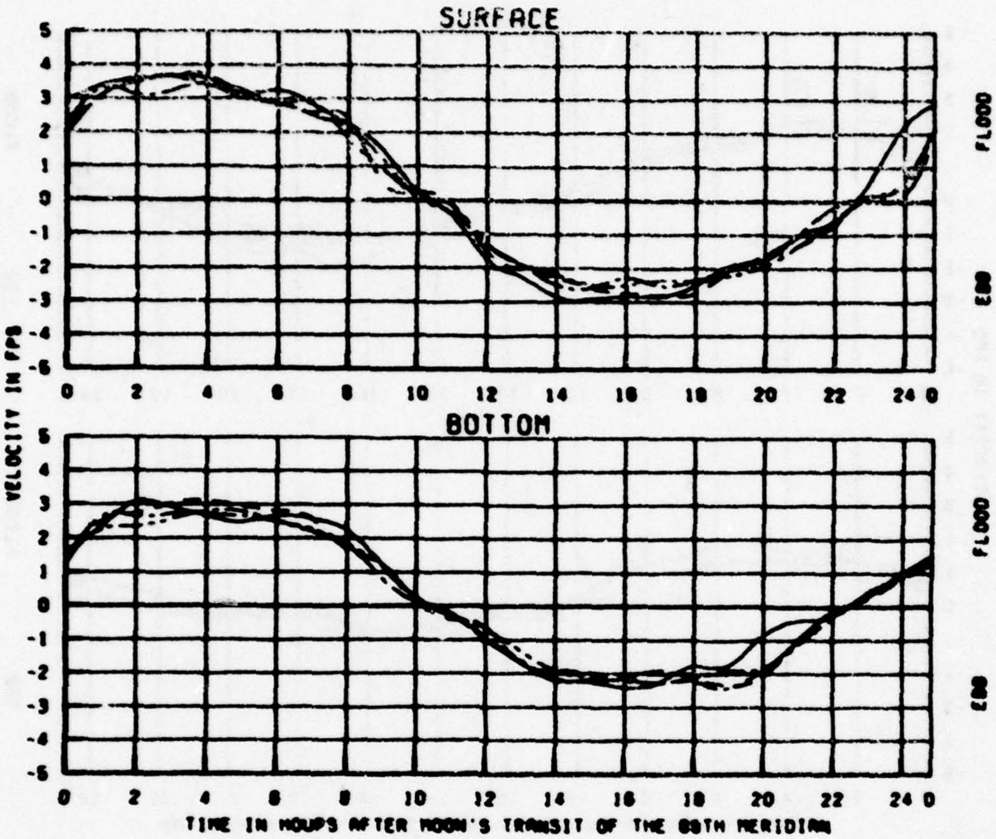
PLAN 1 — — —
PLAN 2 —·—
PLAN 3 --·-—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLANS 1, 2, AND 3 ON TIDAL HEIGHTS

STATION
[illegible]

PLATE 12




TEST CONDITIONS

| | | |
|---|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 9021 | CFS |
| TENSAW RIVER INFLOW | 6479 | CFS |

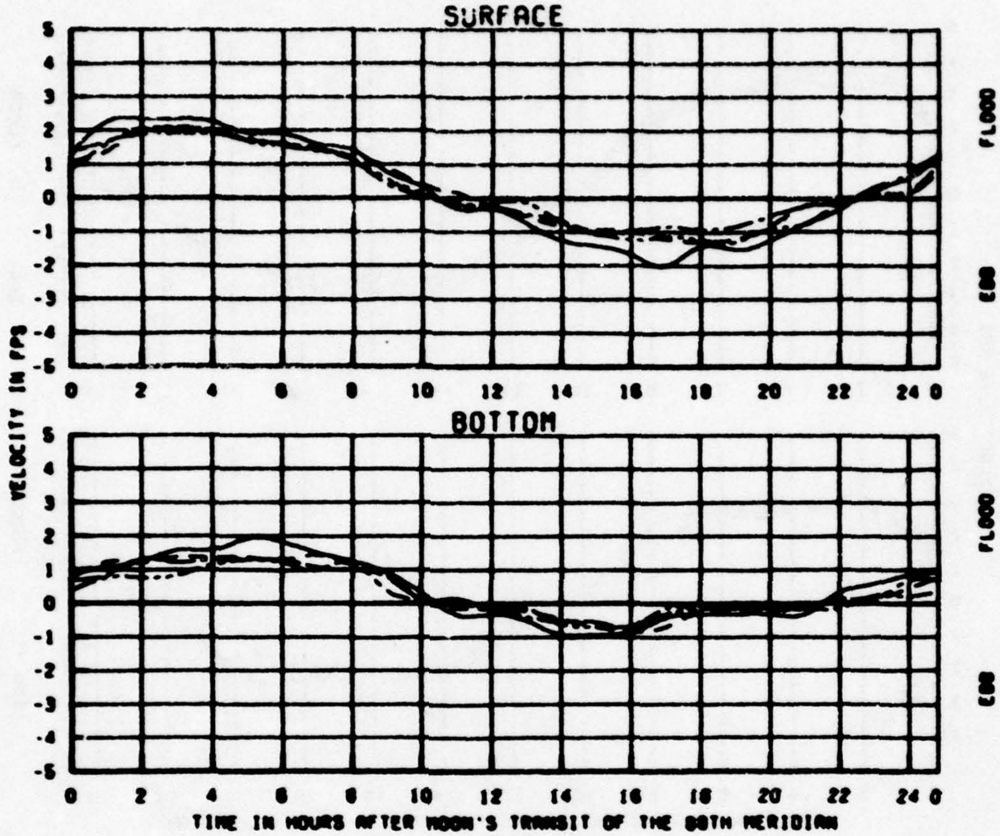
LEGEND

BASE ————
PLAN 1 — — —
PLAN 2 —·—
PLAN 3 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 1, 2, AND 3 ON
VELOCITIES

STATION
1




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND

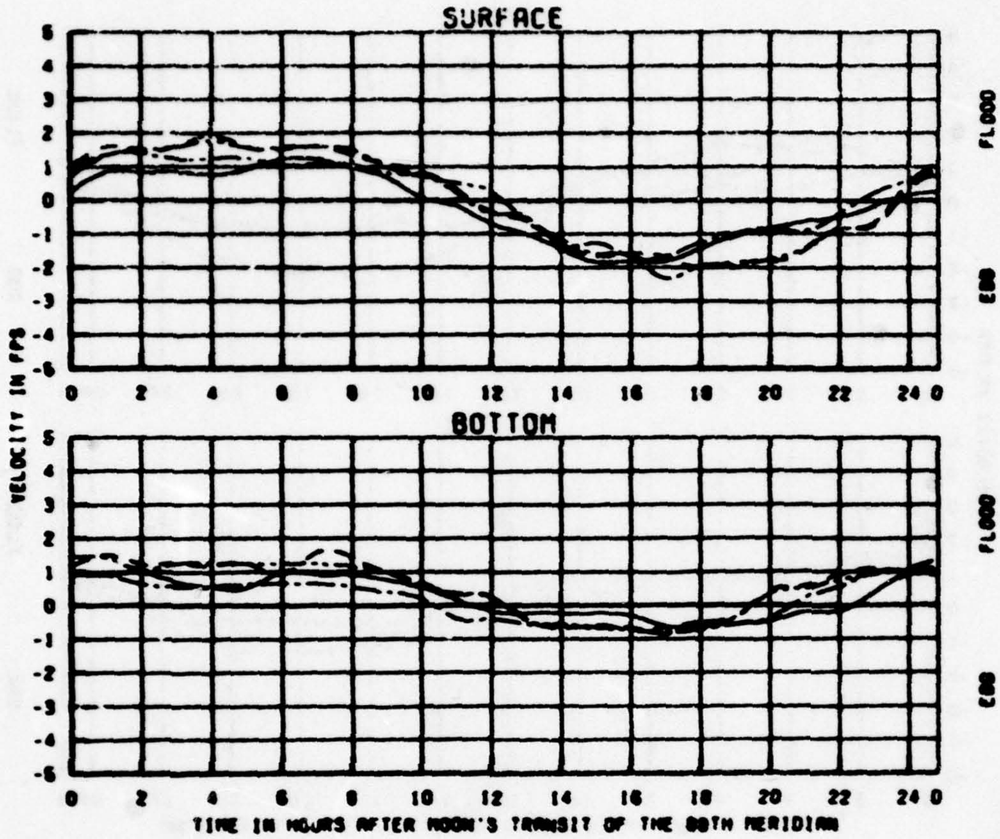
BASE ———
PLAN 1 — — —
PLAN 2 —·—
PLAN 3 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLANS 1, 2, AND 3 ON VELOCITIES

STATION 2

PLATE 14




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND

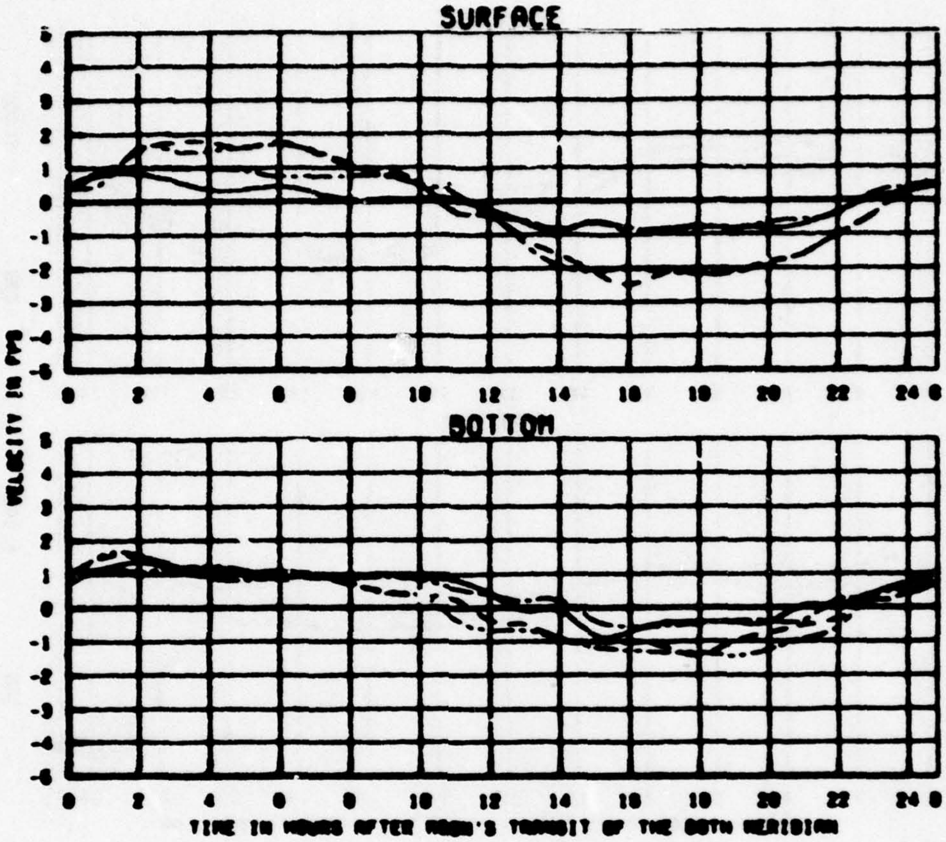
BASE ————
PLAN 1 — — —
PLAN 2 —-—-—
PLAN 3 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 1, 2, AND 3 ON
VELOCITIES

STATION
3

PLATE 15




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 32 PPT |
| MOBILE RIVER INFLOW | 8821 CFS |
| TENSAW RIVER INFLOW | 3470 CFS |

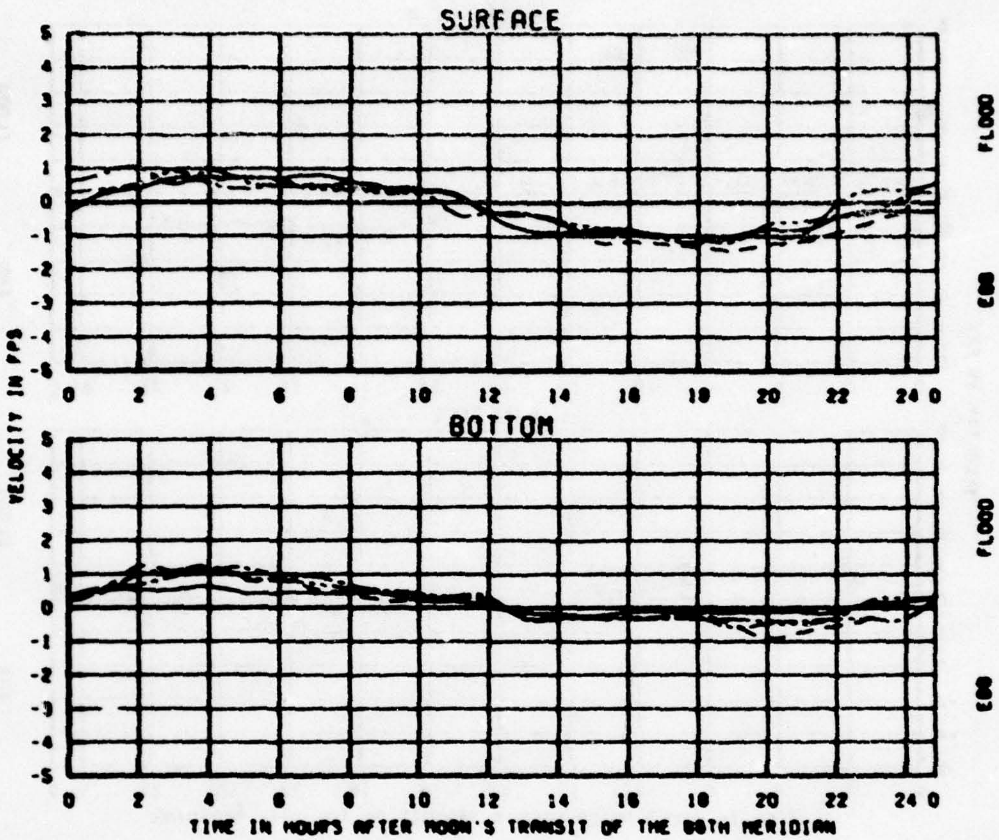
LEGEND

BASE ————
PLAN 1 — — —
PLAN 2 —·—
PLAN 3 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 1, 2, AND 3 ON
VELOCITIES

STATION
4




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND

BASE ————

PLAN 1 — — —

PLAN 2 —·—

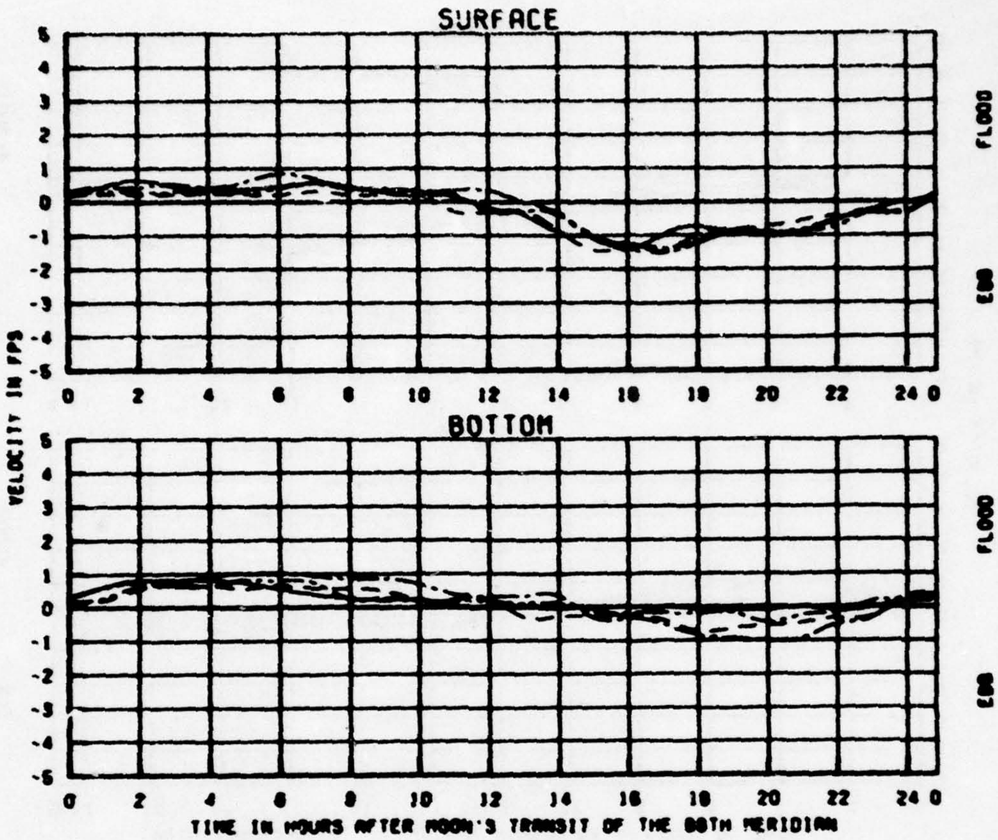
PLAN 3 —··—

MOBILE BAY MODEL

CHANNEL DEEPENING STUDY

EFFECTS OF PLANS 1, 2, AND 3 ON VELOCITIES

STATION 6



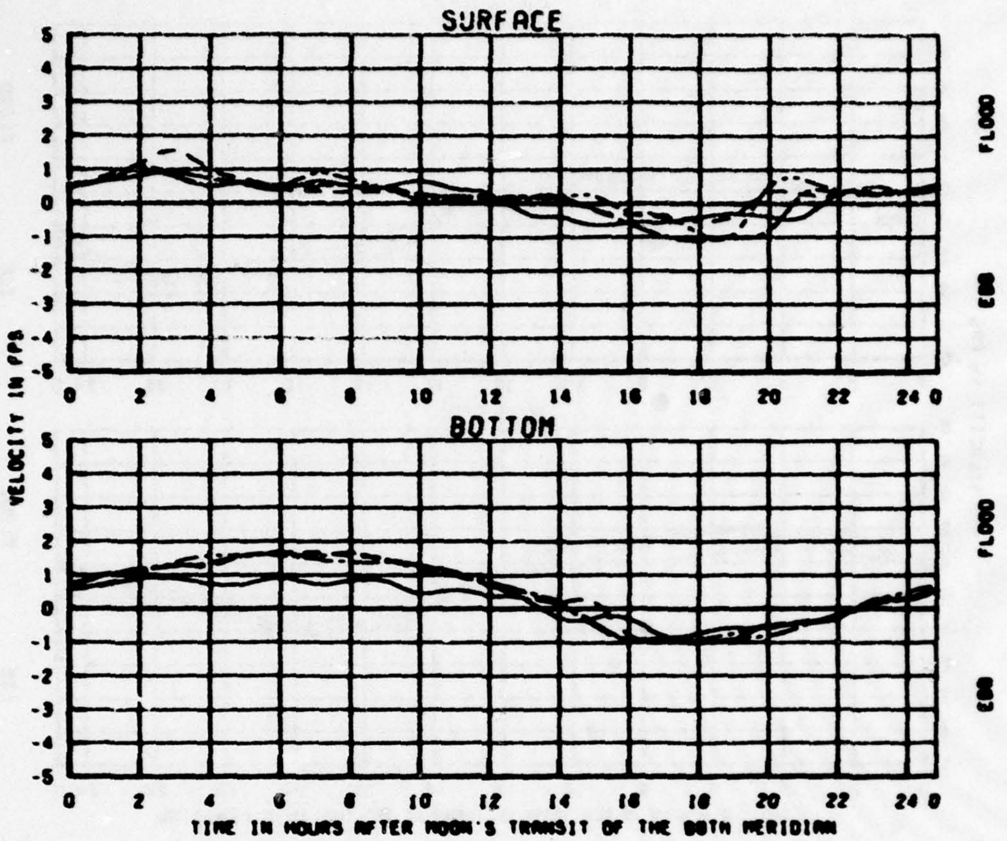

| TEST CONDITIONS | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ————
PLAN 1 — — —
PLAN 2 —·—
PLAN 3 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 1, 2, AND 3 ON
VELOCITIES

STATION
6




TEST CONDITIONS

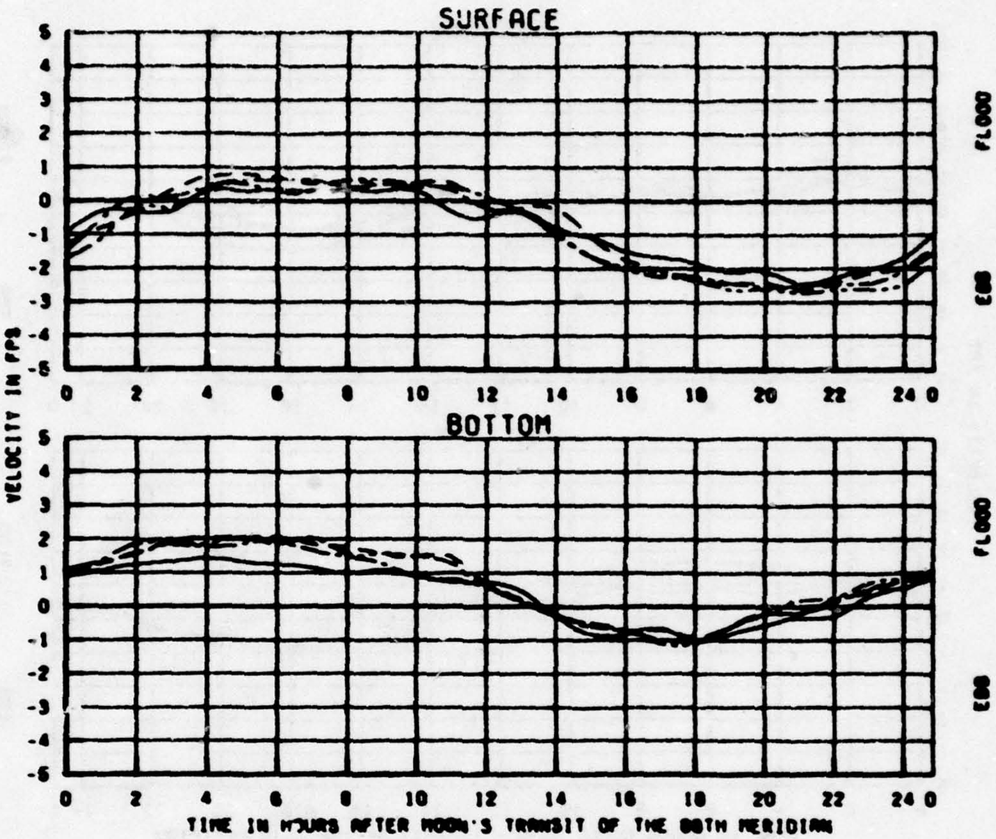
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 1 — — —
PLAN 2 —·—
PLAN 3 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 1, 2, AND 3 ON
VELOCITIES

STATION
7



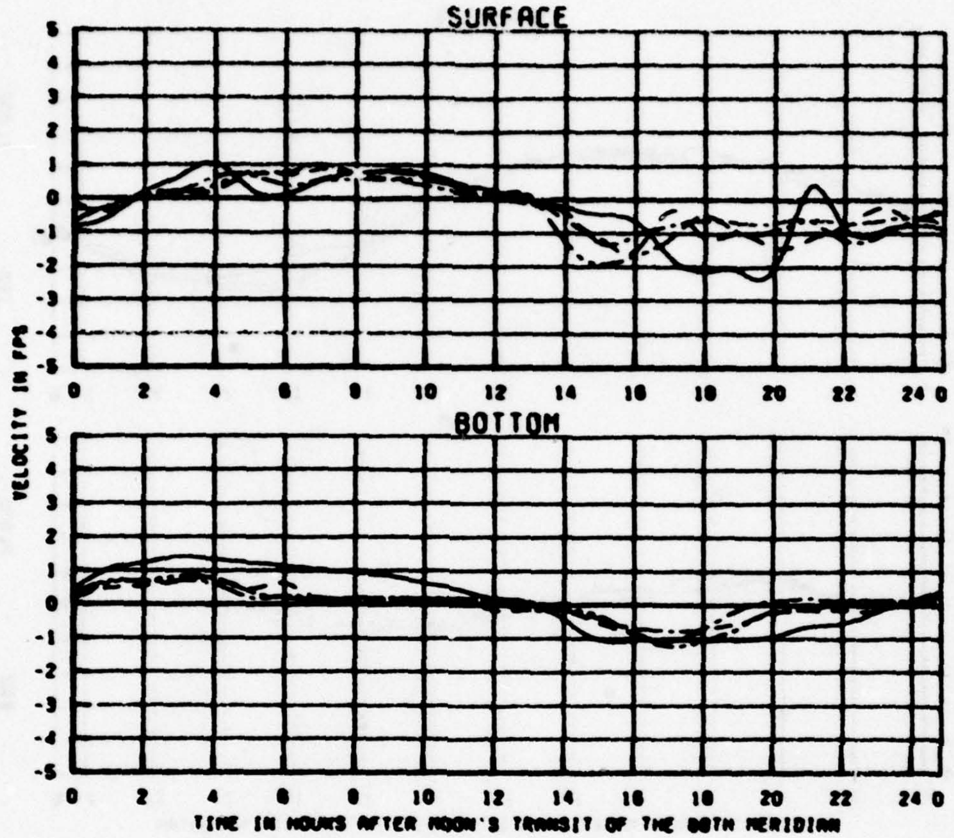

| TEST CONDITIONS | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 1 — — —
PLAN 2 —·—
PLAN 3 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 1, 2, AND 3 ON
VELOCITIES

STATION
8




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

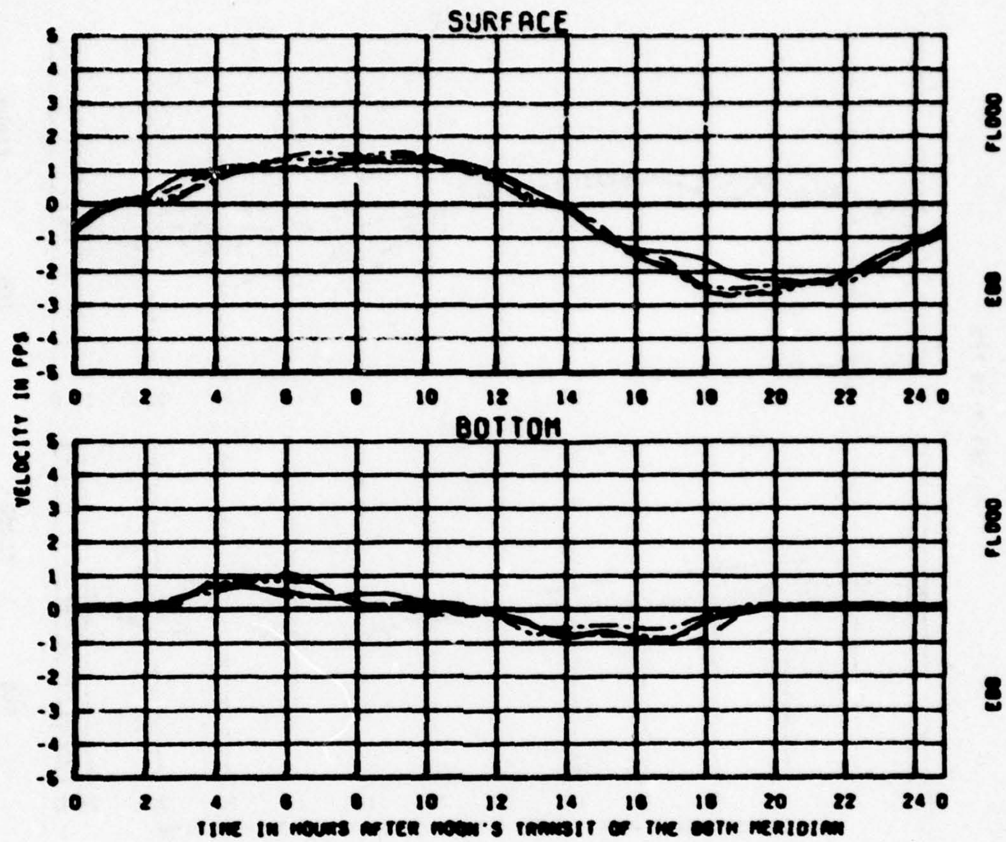
LEGEND

| | |
|---|---|
| BASE | ——— |
| PLAN 1 | — — — |
| PLAN 2 | —·— |
| PLAN 3 | —··— |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 1, 2, AND 3 ON
VELOCITIES

STATION
8




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

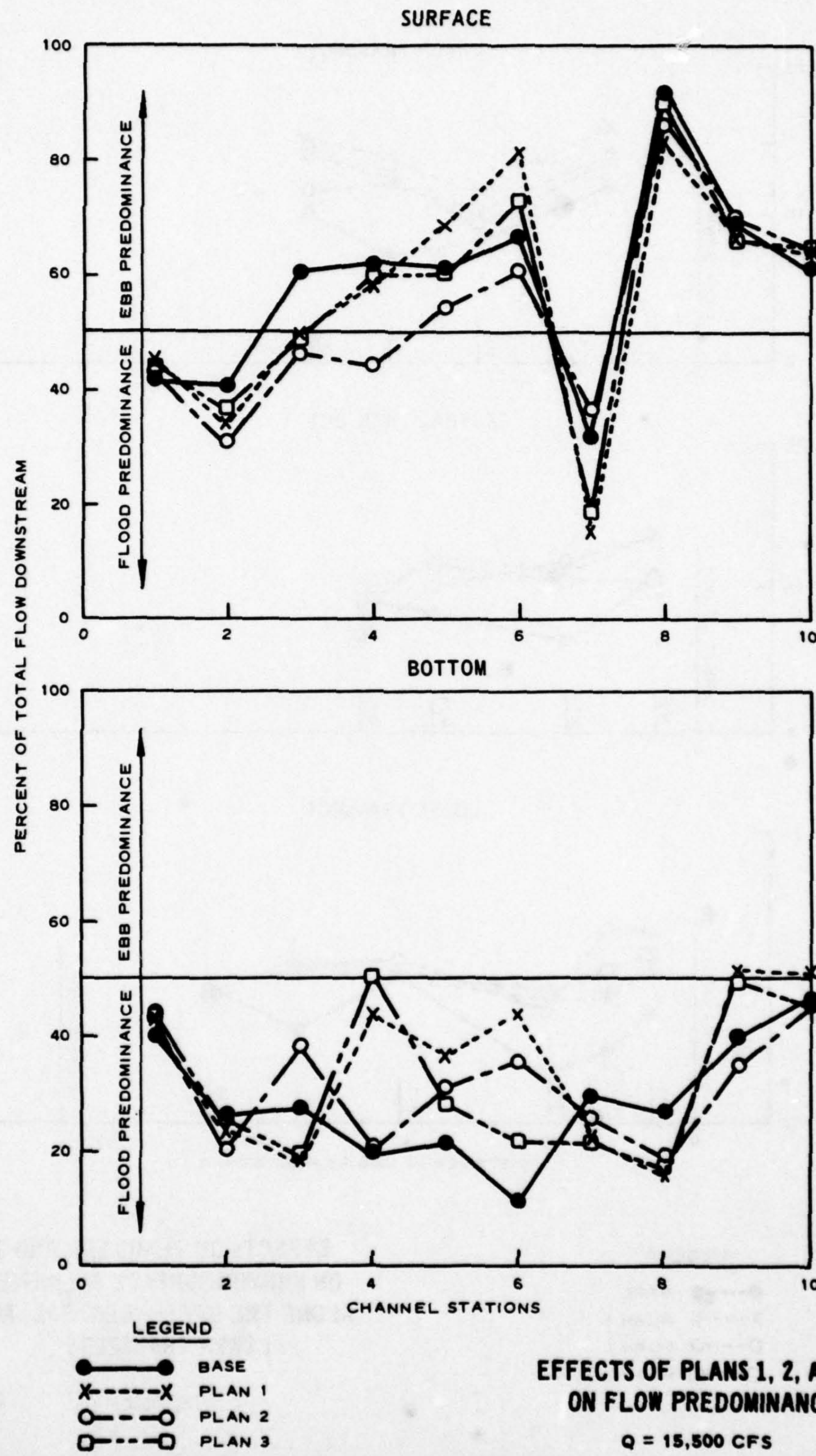
LEGEND
BASE ———
PLAN 1 — — —
PLAN 2 —·—
PLAN 3 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 1, 2, AND 3 ON
VELOCITIES

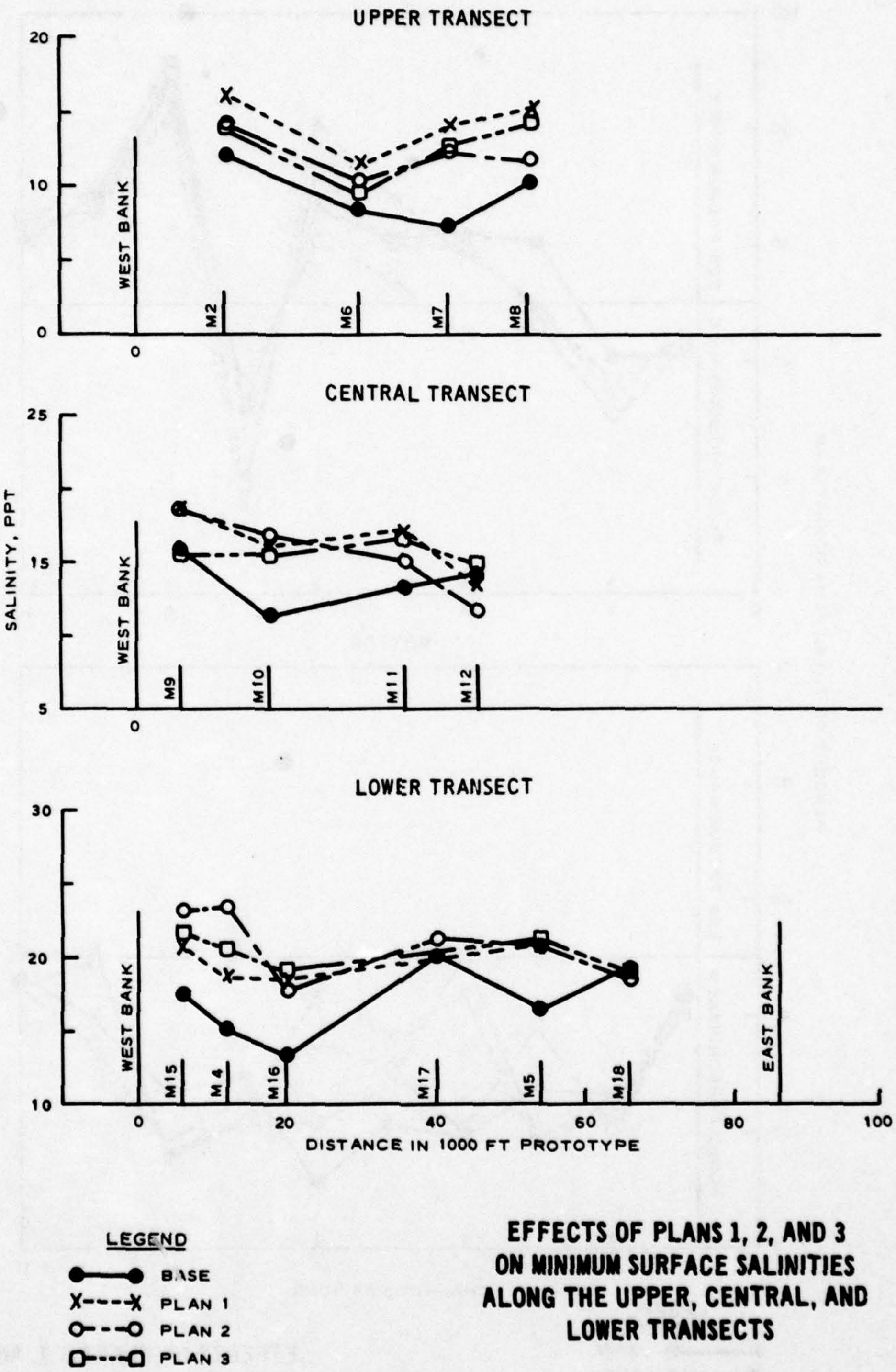
STATION
10

PLATE 22



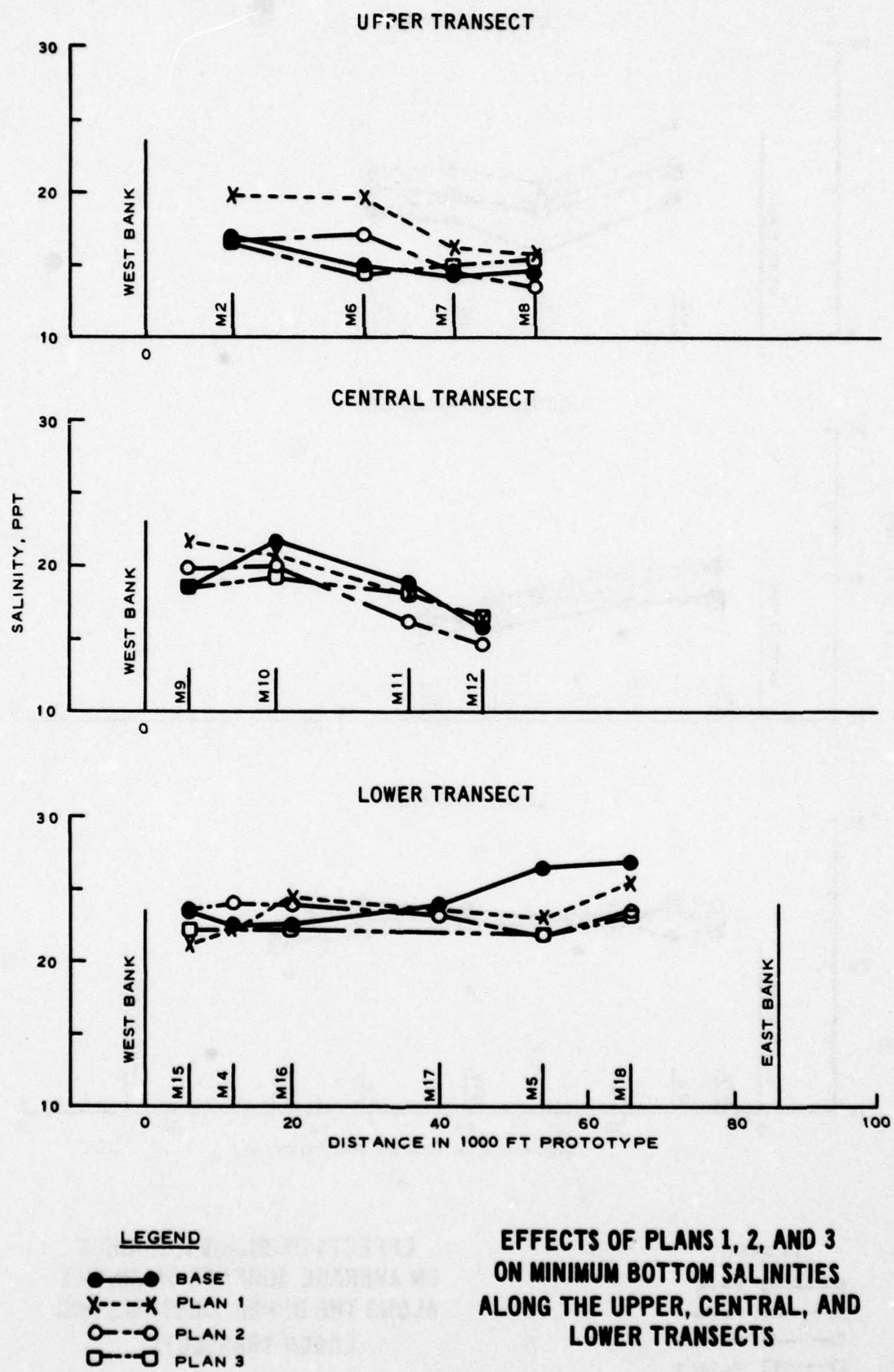

**EFFECTS OF PLANS 1, 2, AND 3 ON FLOW PREDOMINANCE**

Q = 15,500 CFS



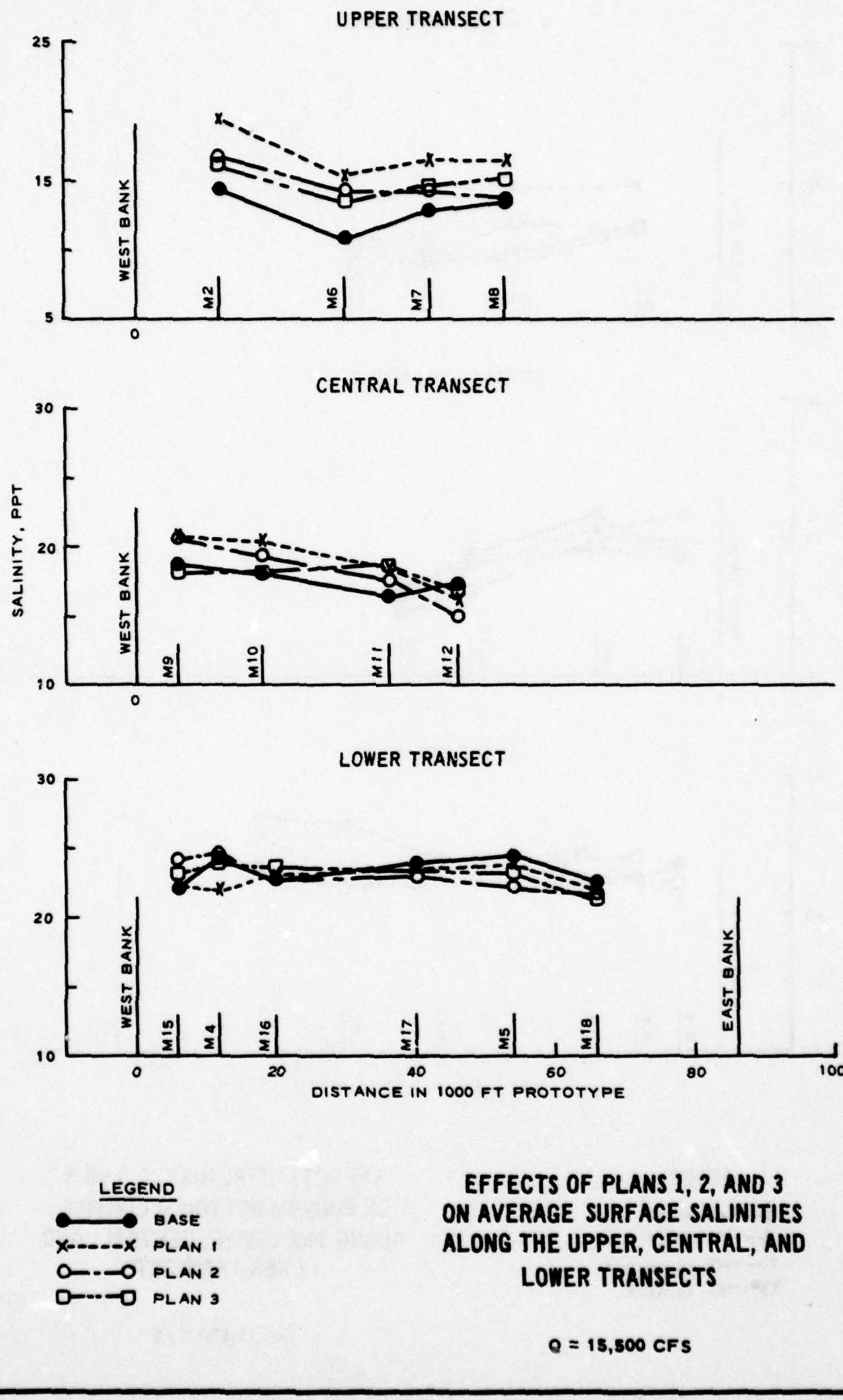

EFFECTS OF PLANS 1, 2, AND 3
ON MINIMUM SURFACE SALINITIES
ALONG THE UPPER, CENTRAL, AND
LOWER TRANSECTS

Q = 15,500 CFS




**EFFECTS OF PLANS 1, 2, AND 3 ON MINIMUM BOTTOM SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

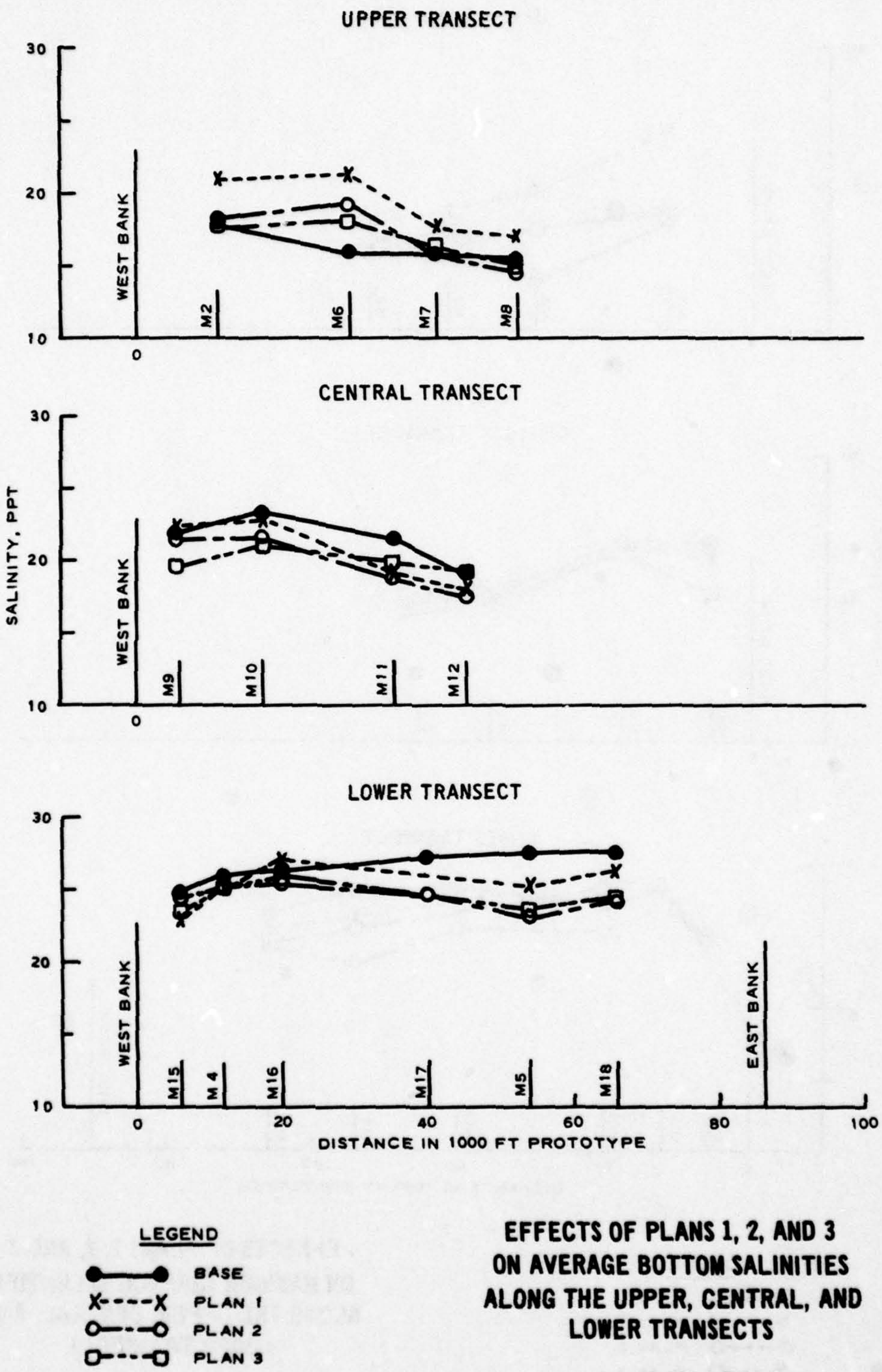
Q = 15,500 CFS




EFFECTS OF PLANS 1, 2, AND 3 ON AVERAGE SURFACE SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS

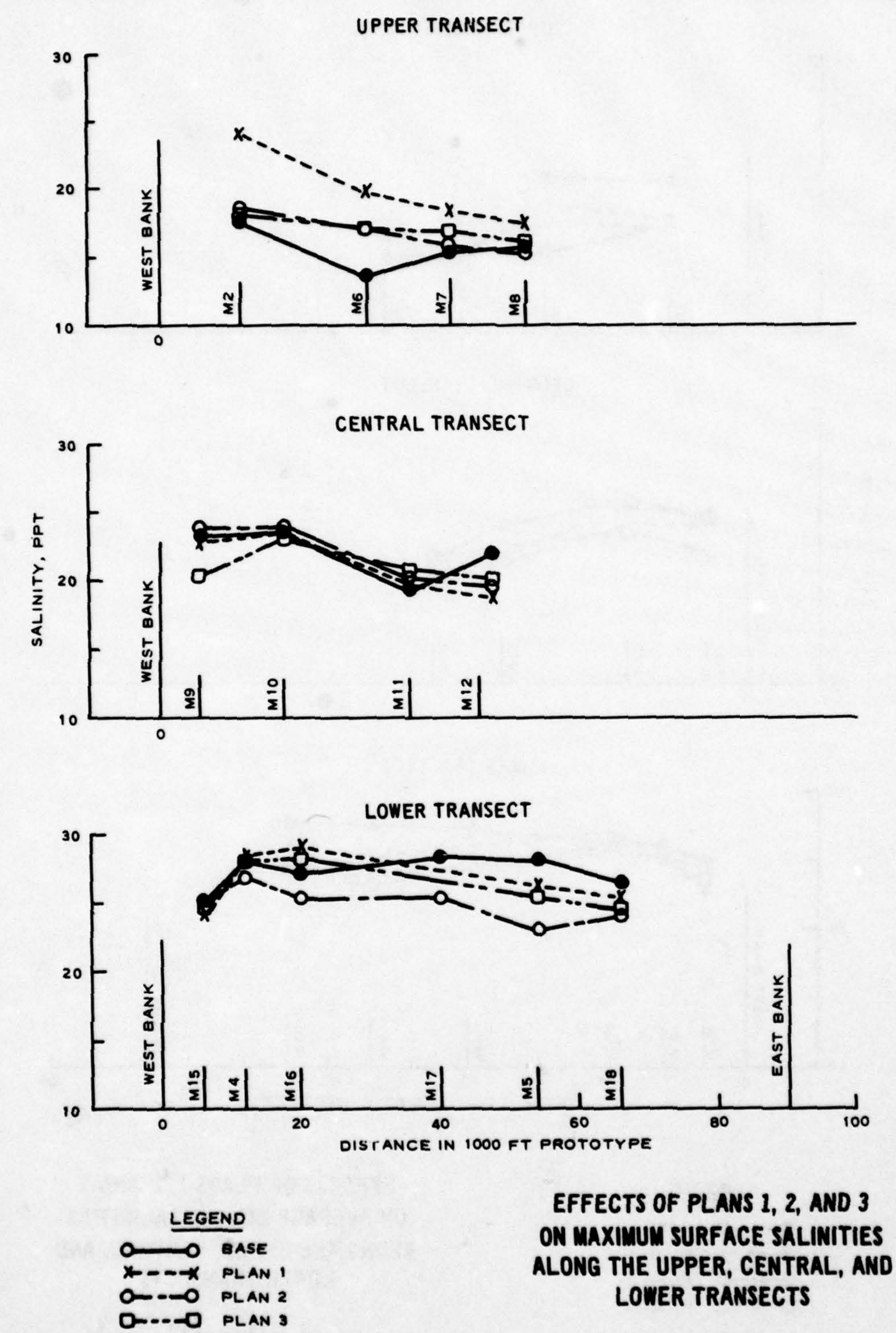
Q = 15,500 CFS

PLATE 26



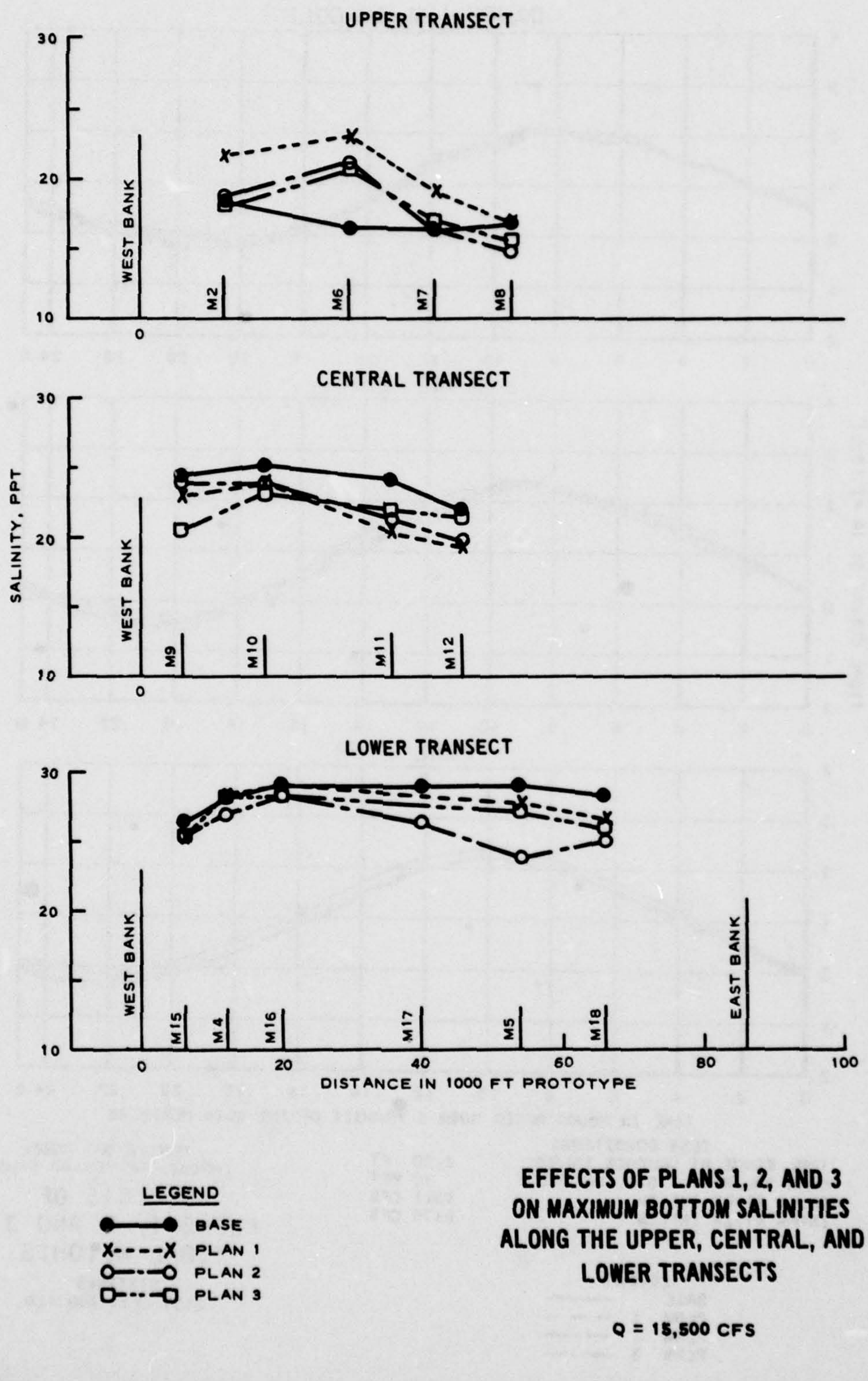

**EFFECTS OF PLANS 1, 2, AND 3 ON AVERAGE BOTTOM SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 15,500 CFS



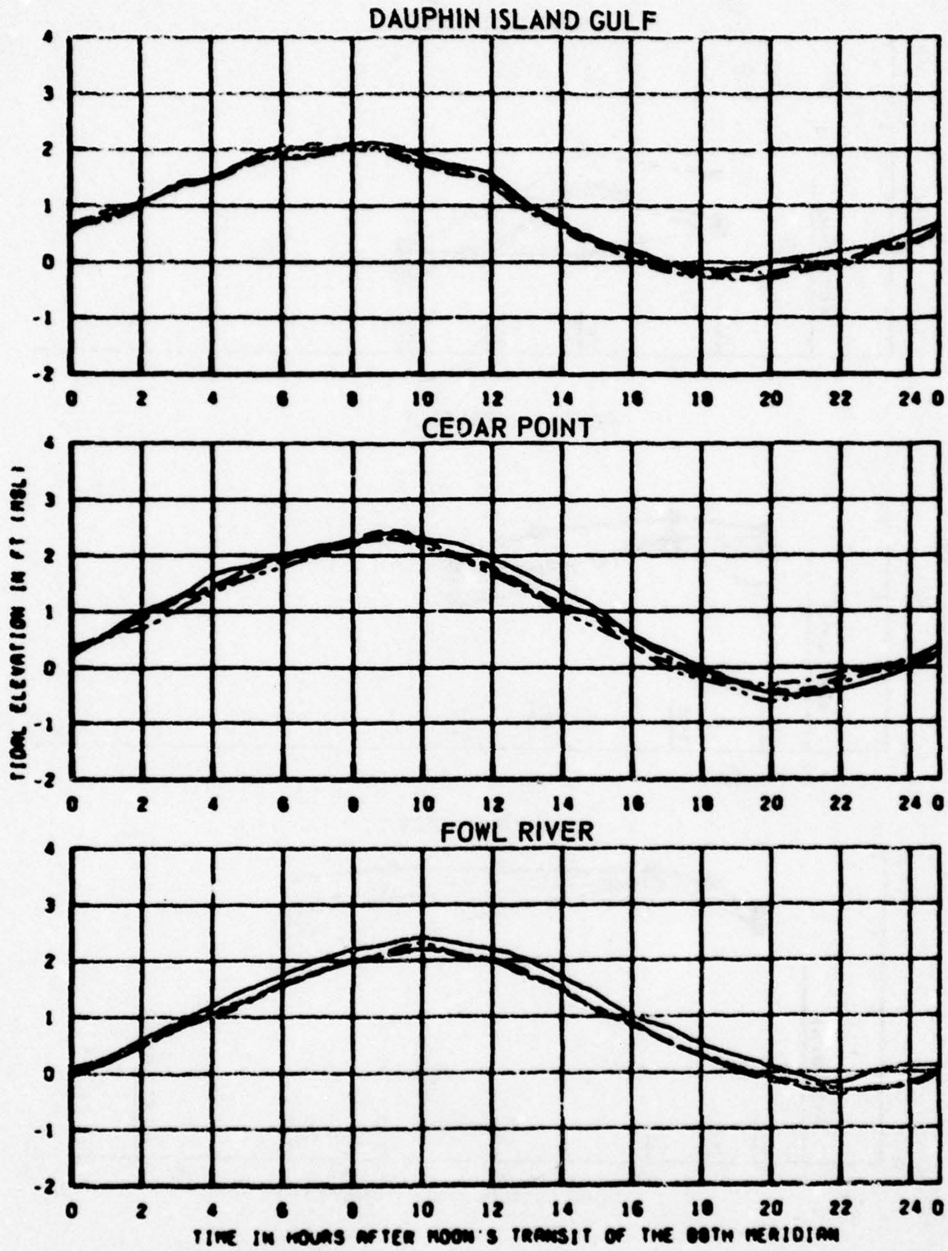

**EFFECTS OF PLANS 1, 2, AND 3 ON MAXIMUM SURFACE SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 15,500 CFS




**EFFECTS OF PLANS 1, 2, AND 3 ON MAXIMUM BOTTOM SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 15,500 CFS




TEST CONDITIONS

| | | |
|---|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 9021 | CFS |
| TENSAW RIVER INFLOW | 6479 | CFS |

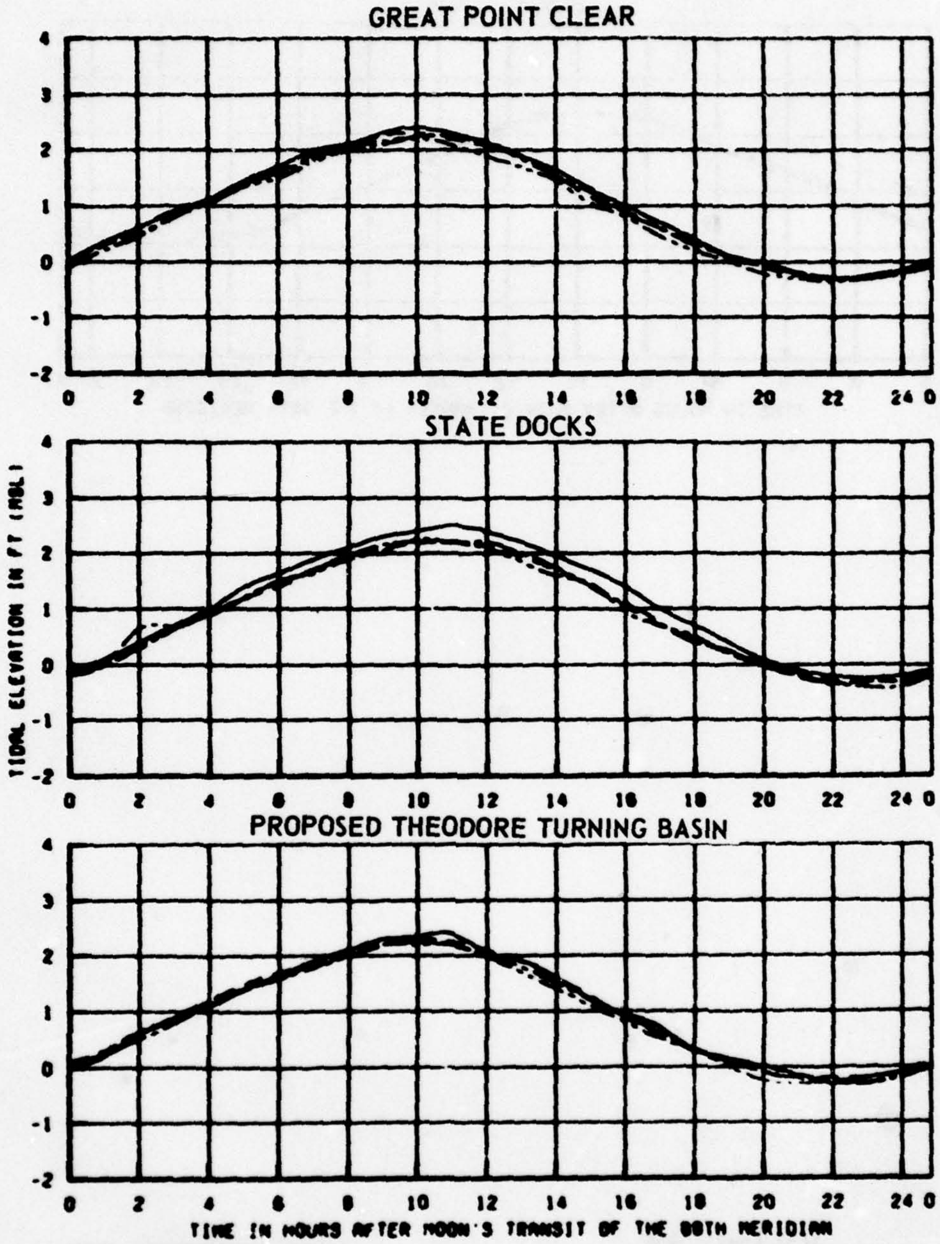
LEGEND

BASE ———
PLAN 1 — — —
PLAN 2 —·—
PLAN 3 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 1, 2, AND 3 ON
TIDAL HEIGHTS

STATIONS
DIG, CPT, AND FLR




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

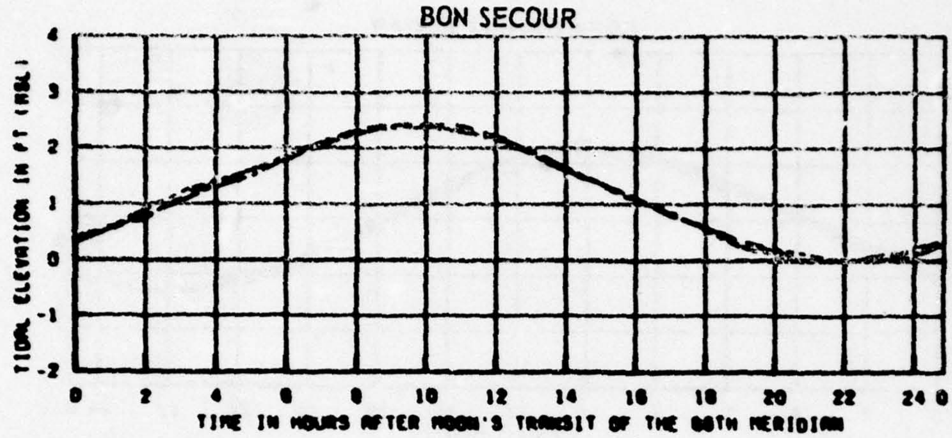
LEGEND

BASE ———
PLAN 4 — — —
PLAN 5 —·—
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 4, 5, AND 6 ON
TIDAL HEIGHTS

STATIONS
GPC, SD, AND TB




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6470 CFS |

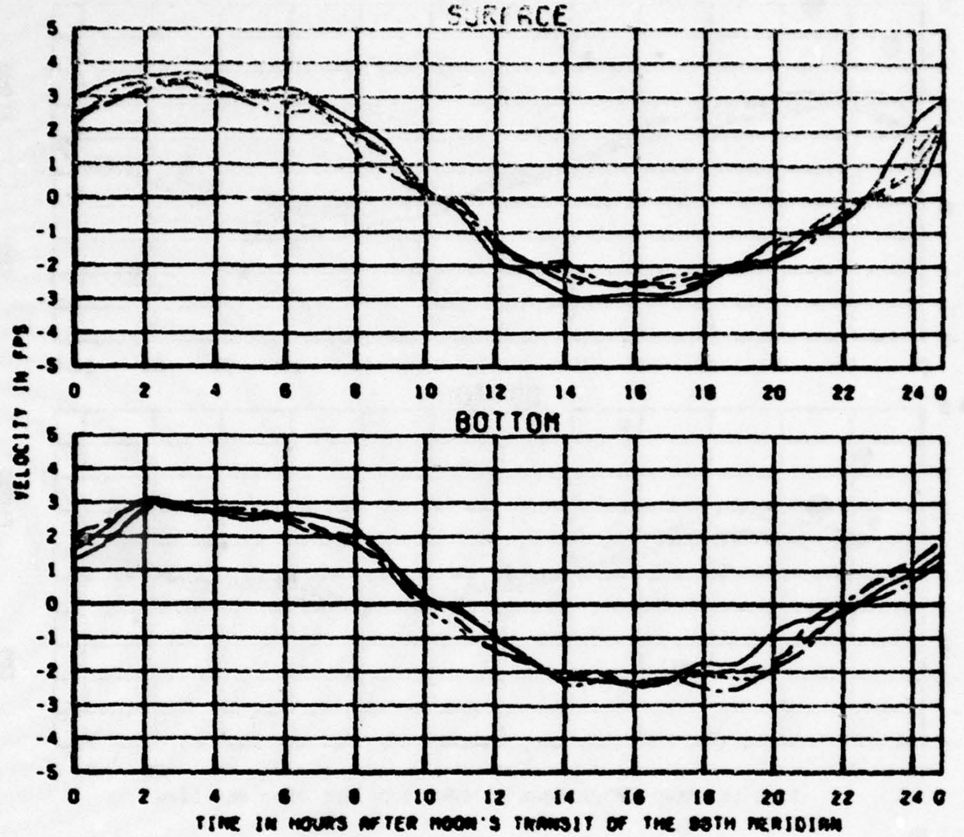
LEGEND

PLAN 4 — — —
PLAN 5 —·—
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 4, 5, AND 6 ON
TIDAL HEIGHTS

STATION
BNS



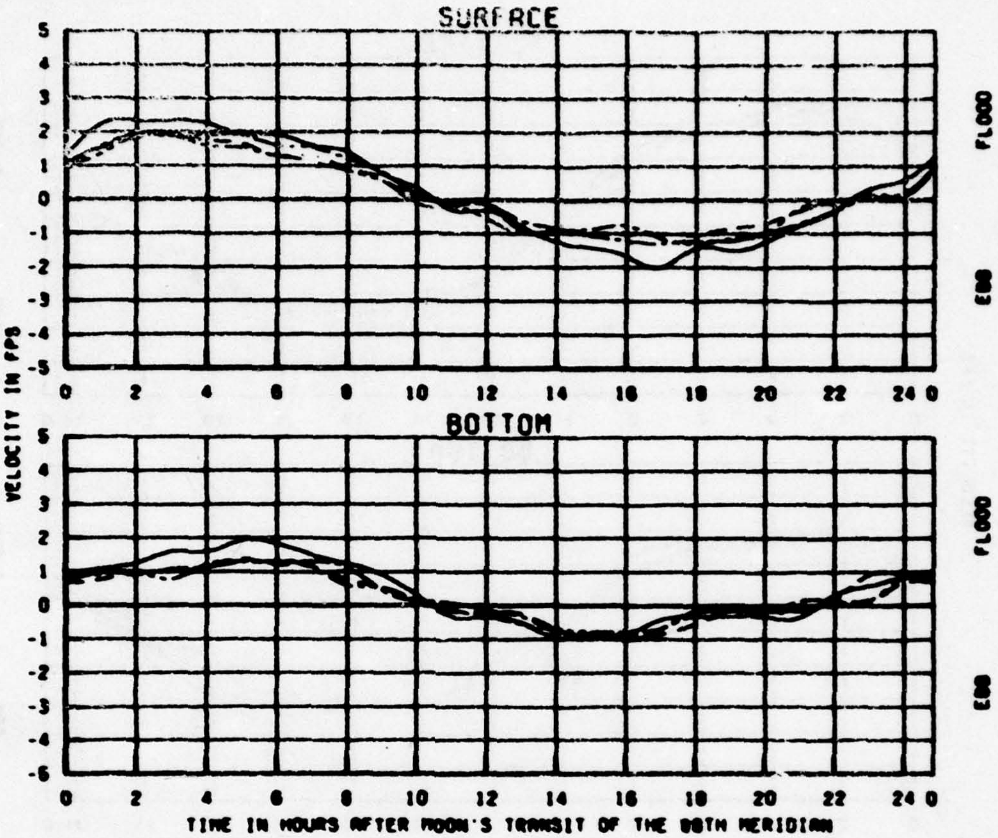

| TEST CONDITIONS | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 4 — — —
PLAN 5 —·—
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLANS 4, 5, AND 6 ON VELOCITIES

STATION 1




TEST CONDITIONS

| | | |
|---|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 9021 | CFS |
| TENSAW RIVER INFLOW | 6479 | CFS |

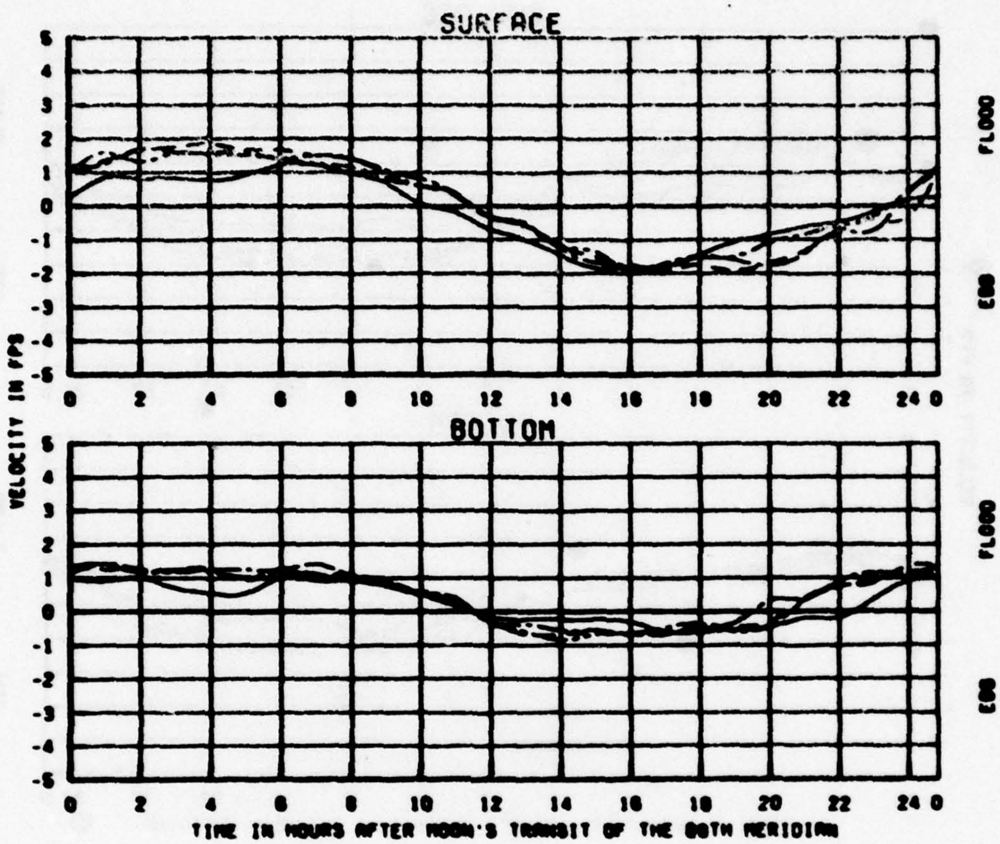
LEGEND

BASE ————
PLAN 4 — — —
PLAN 5 —·—
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 4, 5, AND 6 ON
VELOCITIES

STATION
2




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND

BASE ———

PLAN 4 — — —

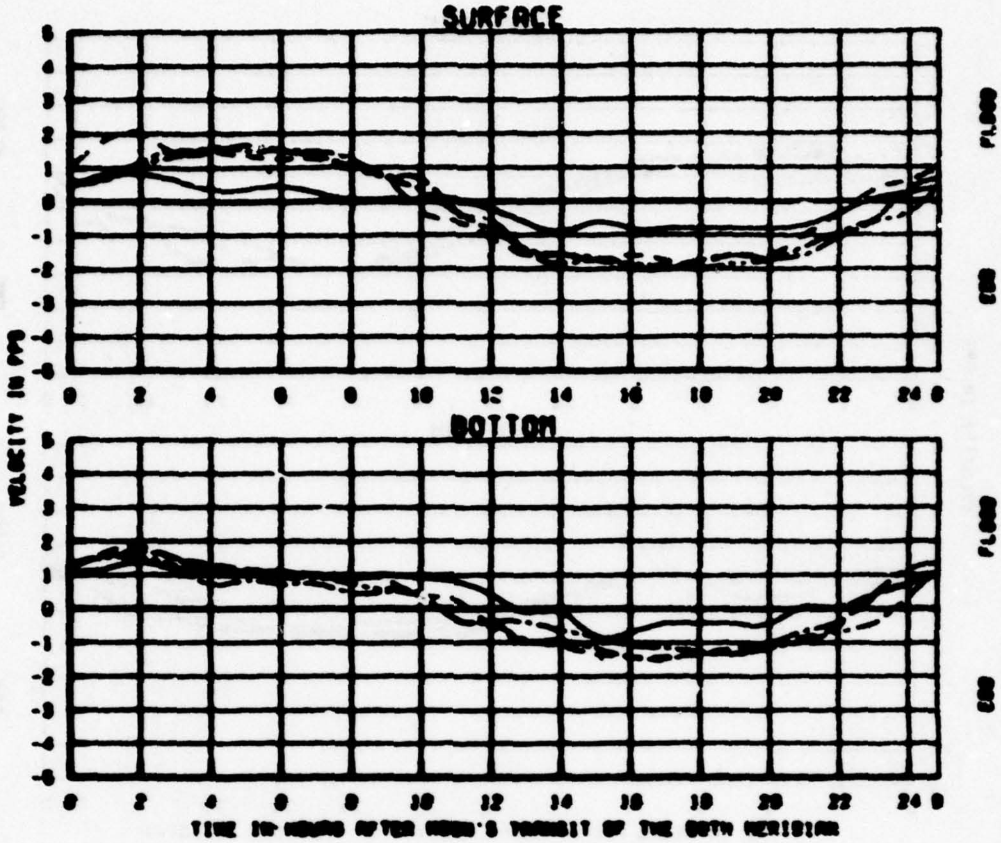
PLAN 5 —·—

PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLANS 4, 5, AND 6 ON VELOCITIES

STATION 3




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | [illegible] FT |
| OCEAN SALINITY (TOTAL SALTS) | [illegible] PPT |
| MOBILE RIVER INFLOW | [illegible] CFS |
| TENSAW RIVER INFLOW | [illegible] CFS |

LEGEND

BASE

PLAN 4

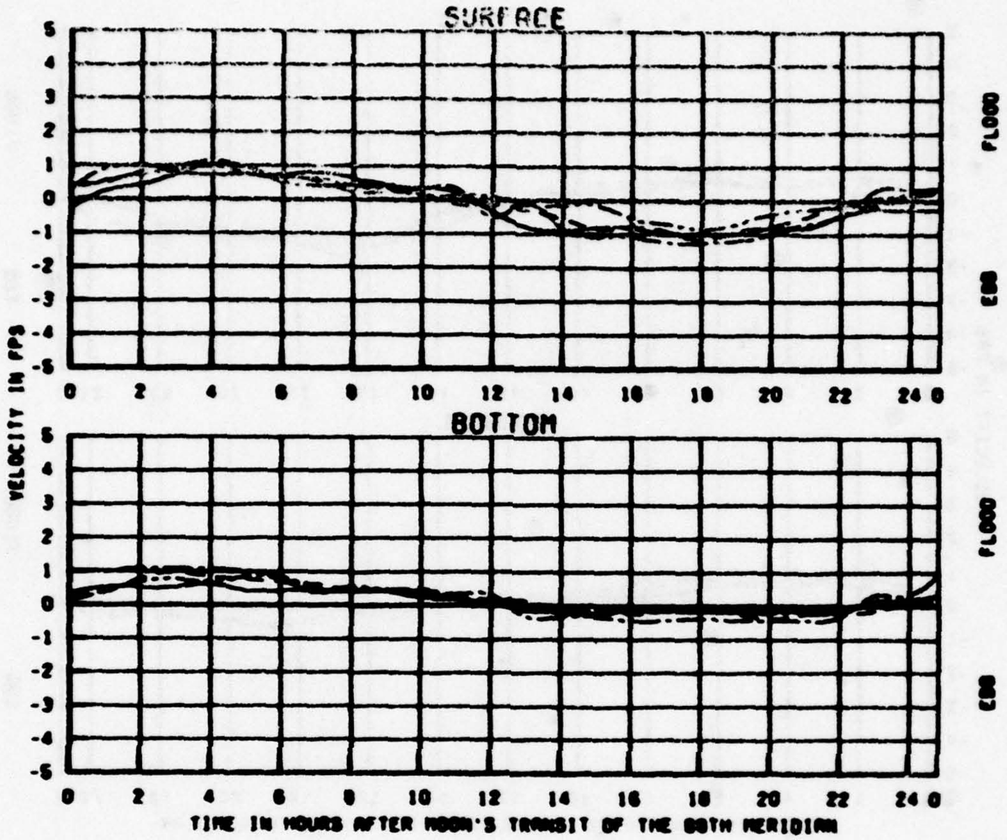
PLAN 5

PLAN 6

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

**EFFECTS OF PLANS 4, 5, AND 6 ON VELOCITIES**

STATION [illegible]




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

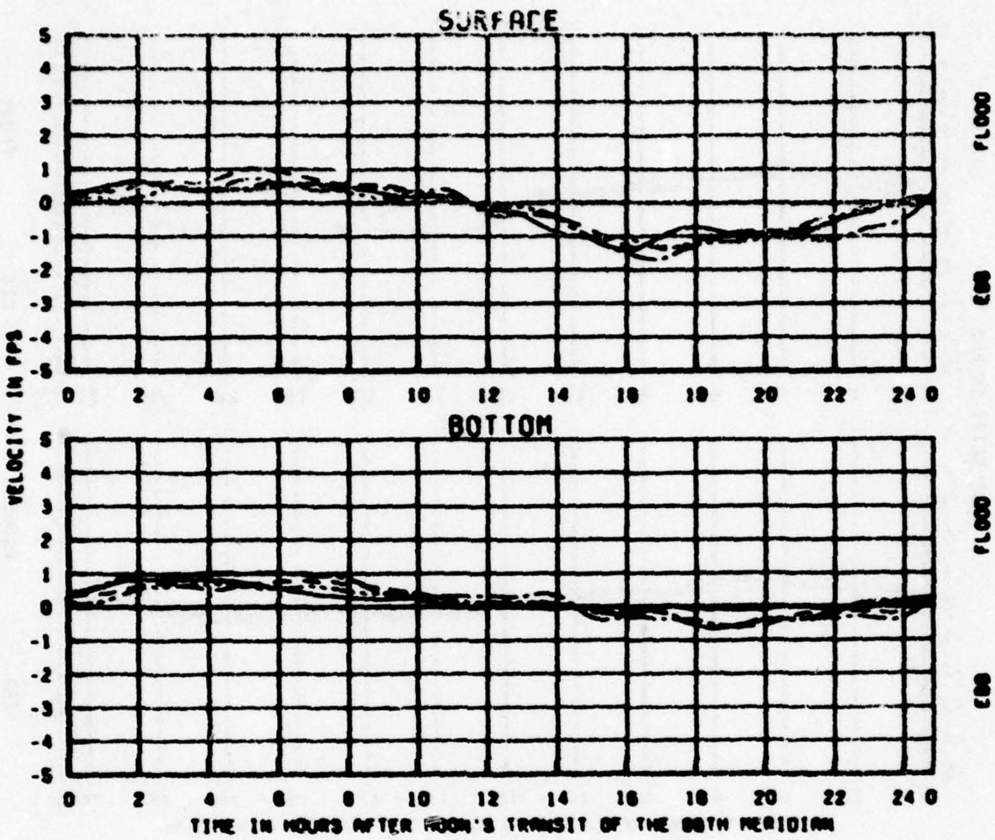
LEGEND

BASE ————
PLAN 4 — — —
PLAN 5 —·—
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLANS 4, 5, AND 6 ON VELOCITIES

STATION
6




TEST CONDITIONS

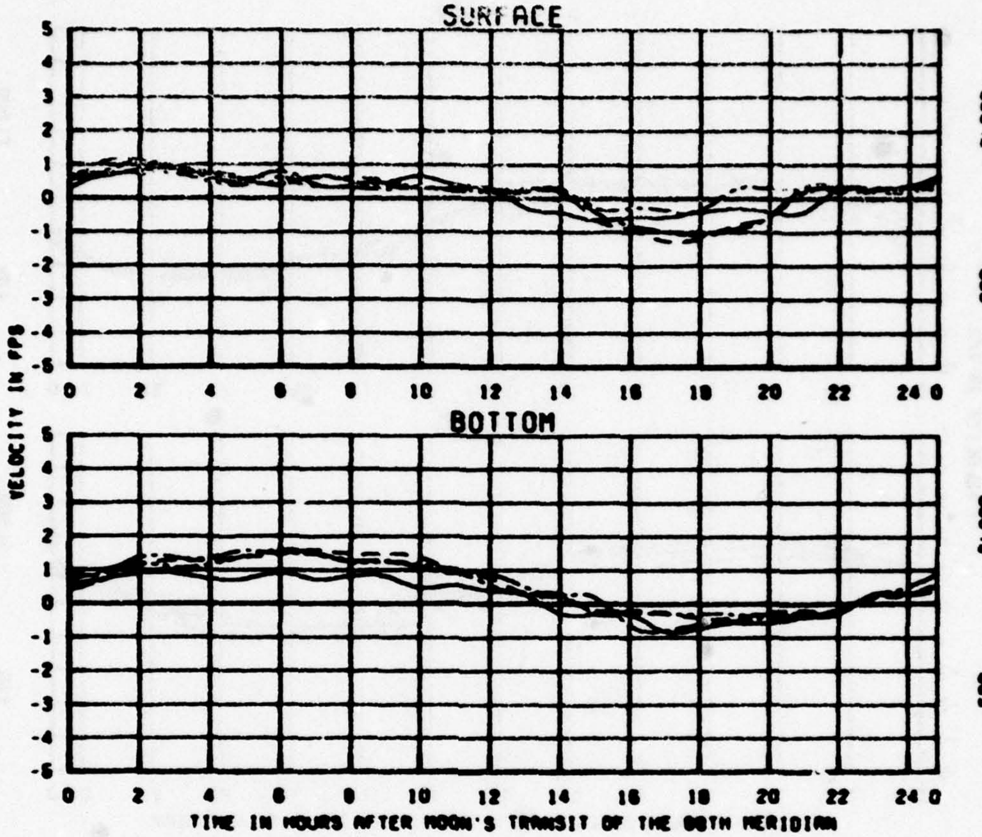
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 4 — — —
PLAN 5 —·—
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 4, 5, AND 6 ON
VELOCITIES

STATION
6




TEST CONDITIONS

| | | |
|---|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 9021 | CFS |
| TENSAW RIVER INFLOW | 6479 | CFS |

LEGEND

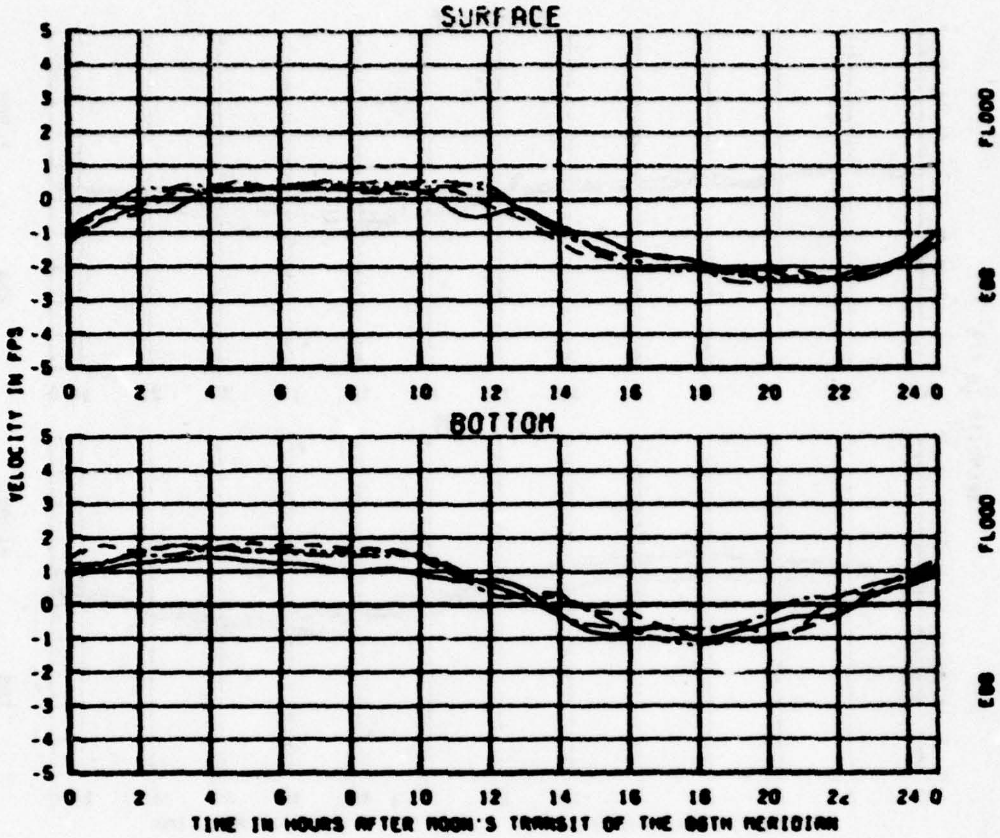
BASE ————
PLAN 4 — — —
PLAN 5 —·—
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 4, 5, AND 6 ON
VELOCITIES

STATION
7

PLATE 39




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND

BASE ———

PLAN 4 — — —

PLAN 5 —·—

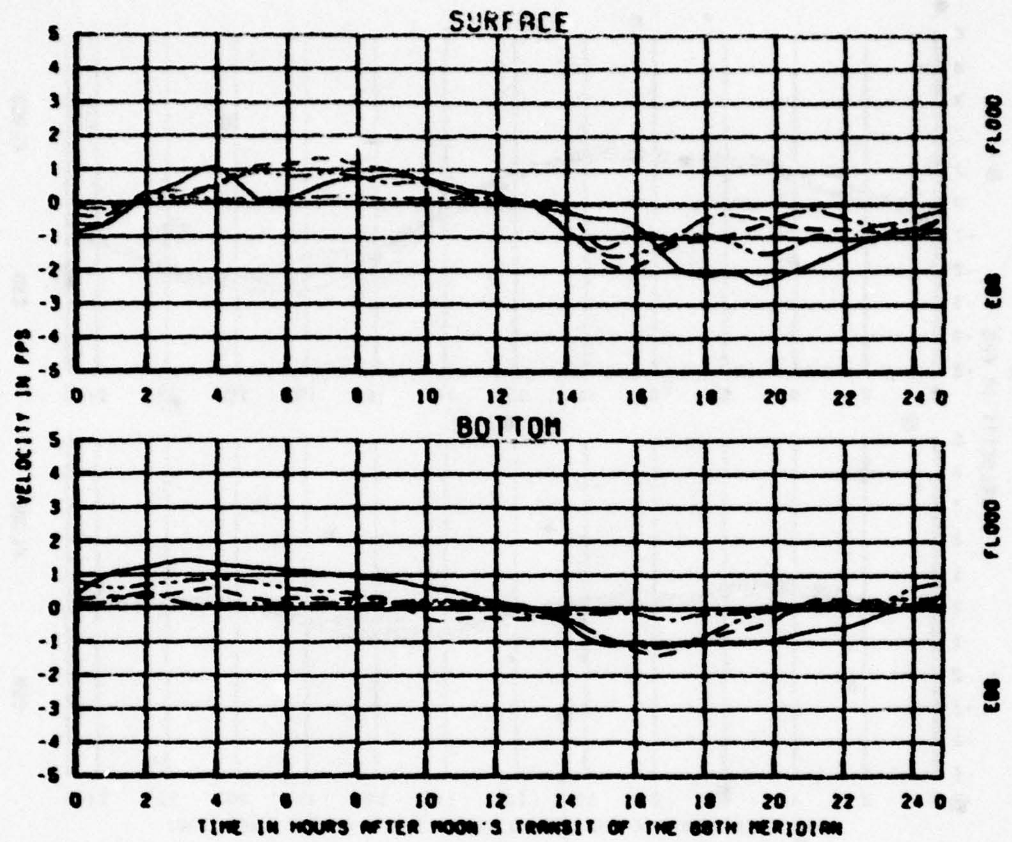
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLANS 4, 5, AND 6 ON VELOCITICS

STATION
B

PLATE 40



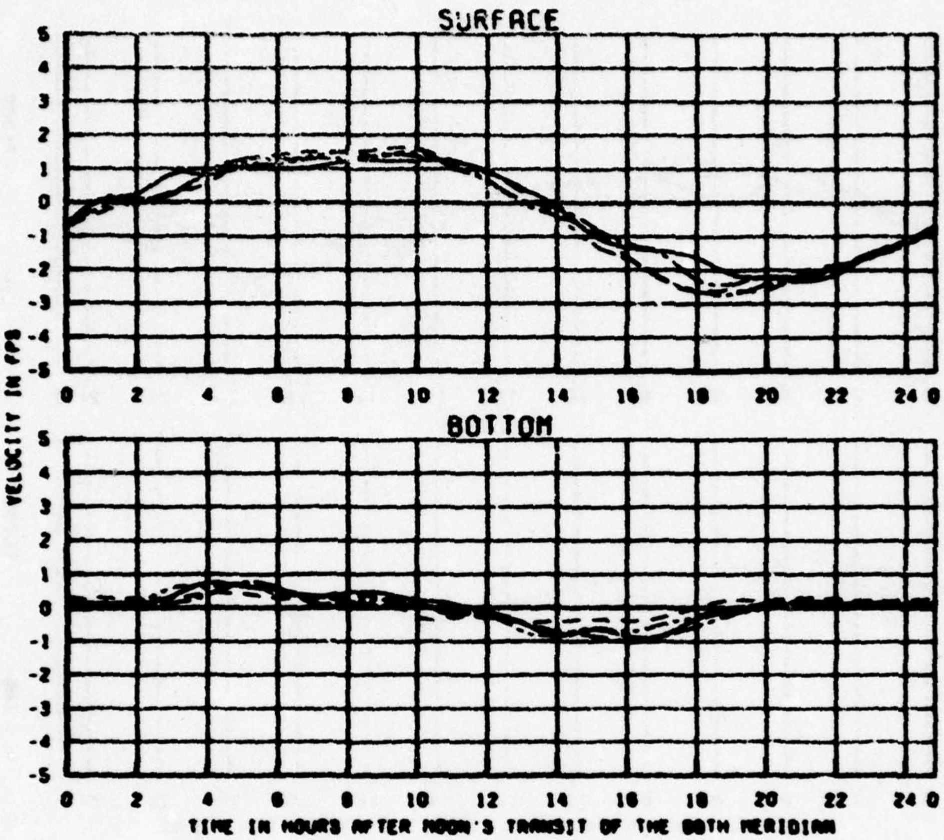

| TEST CONDITIONS | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 8021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 4 — — —
PLAN 5 —·—
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLANS 4, 5, AND 6 ON
VELOCITIES

STATION
9




TEST CONDITIONS

| | | |
|---|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 9021 | CFS |
| TENSAW RIVER INFLOW | 6479 | CFS |

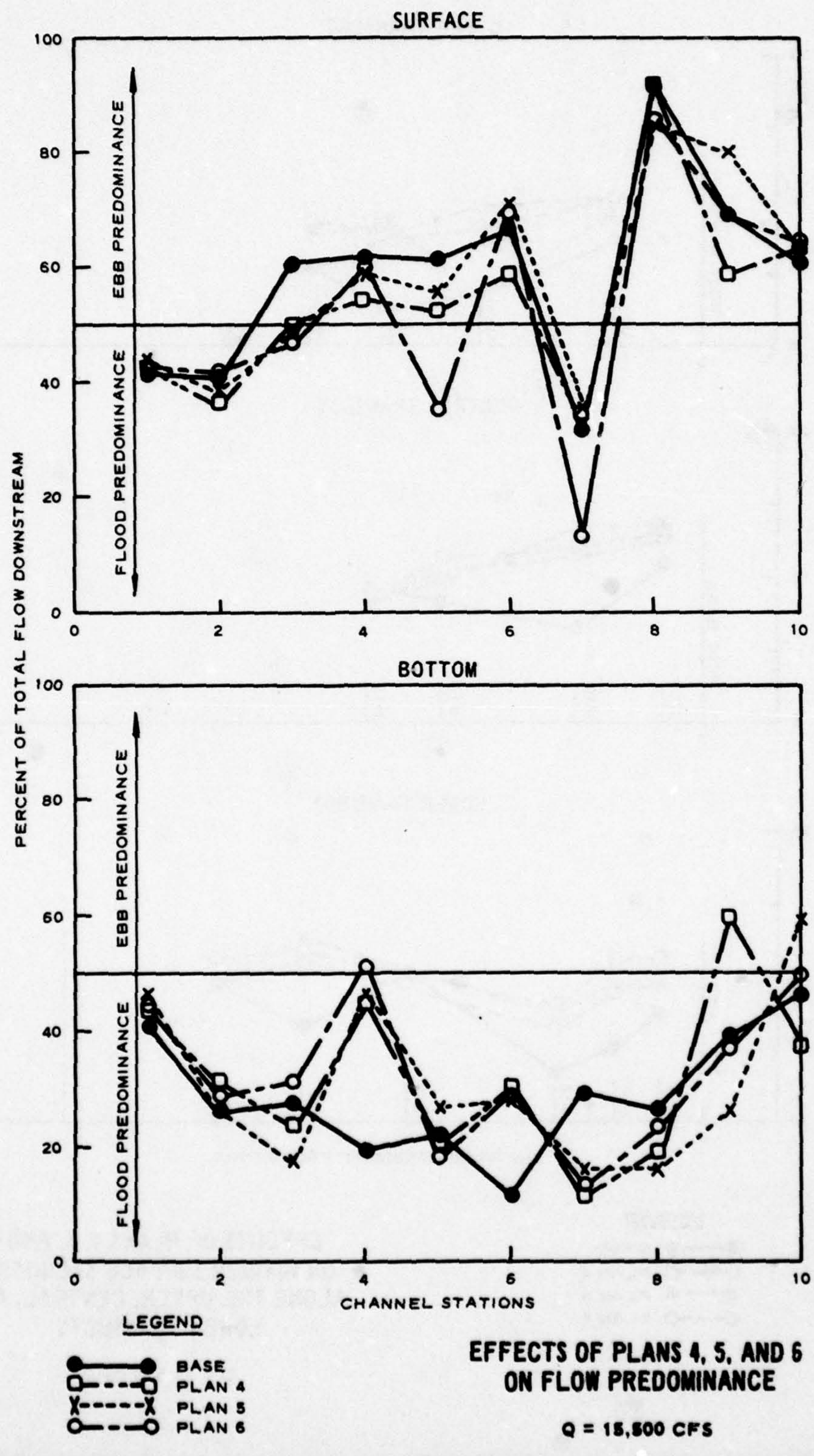
LEGEND

BASE ————
PLAN 4 — — —
PLAN 5 —·—
PLAN 6 —··—

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

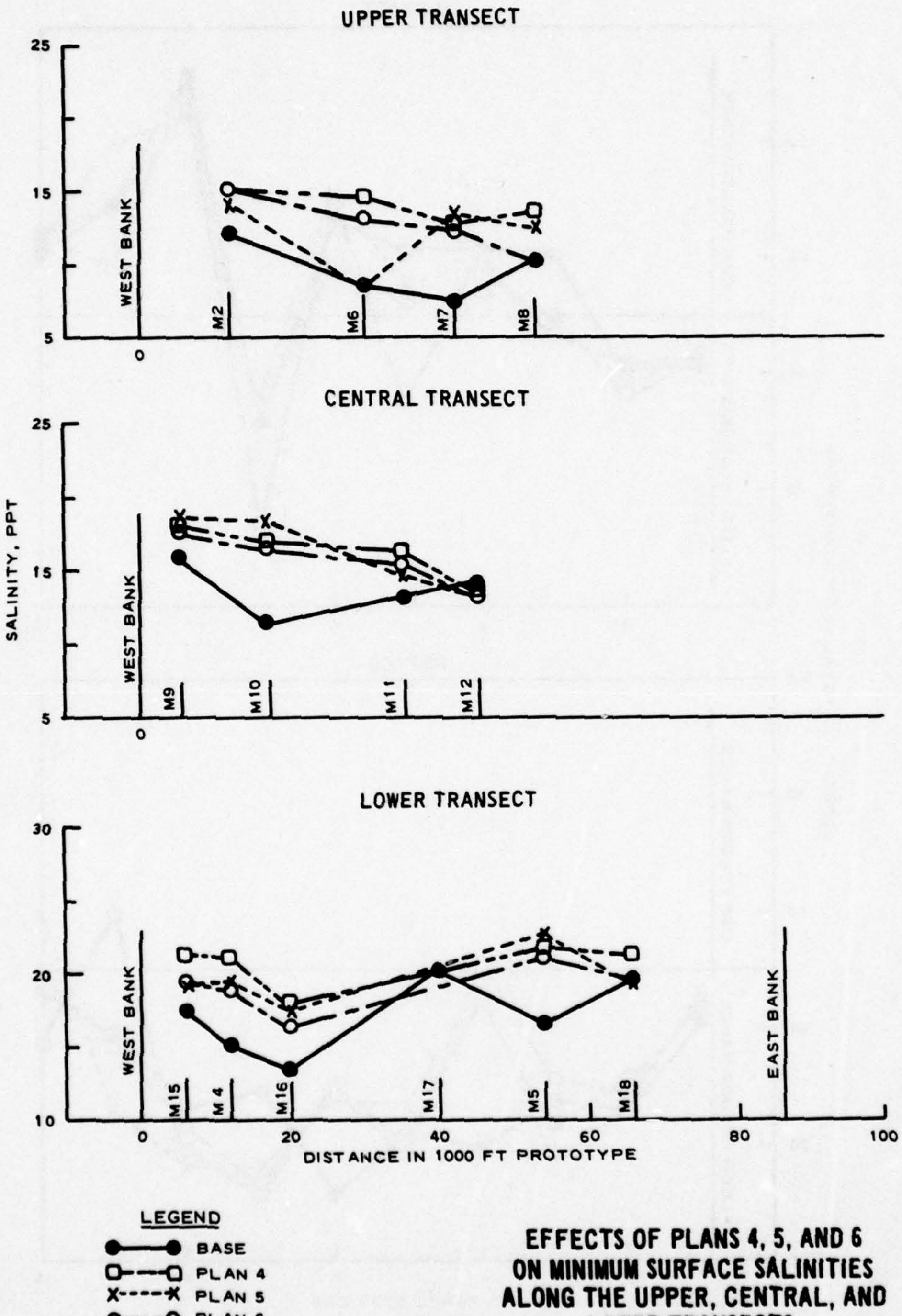
EFFECTS OF PLANS 4, 5, AND 6 ON VELOCITIES

STATION 10



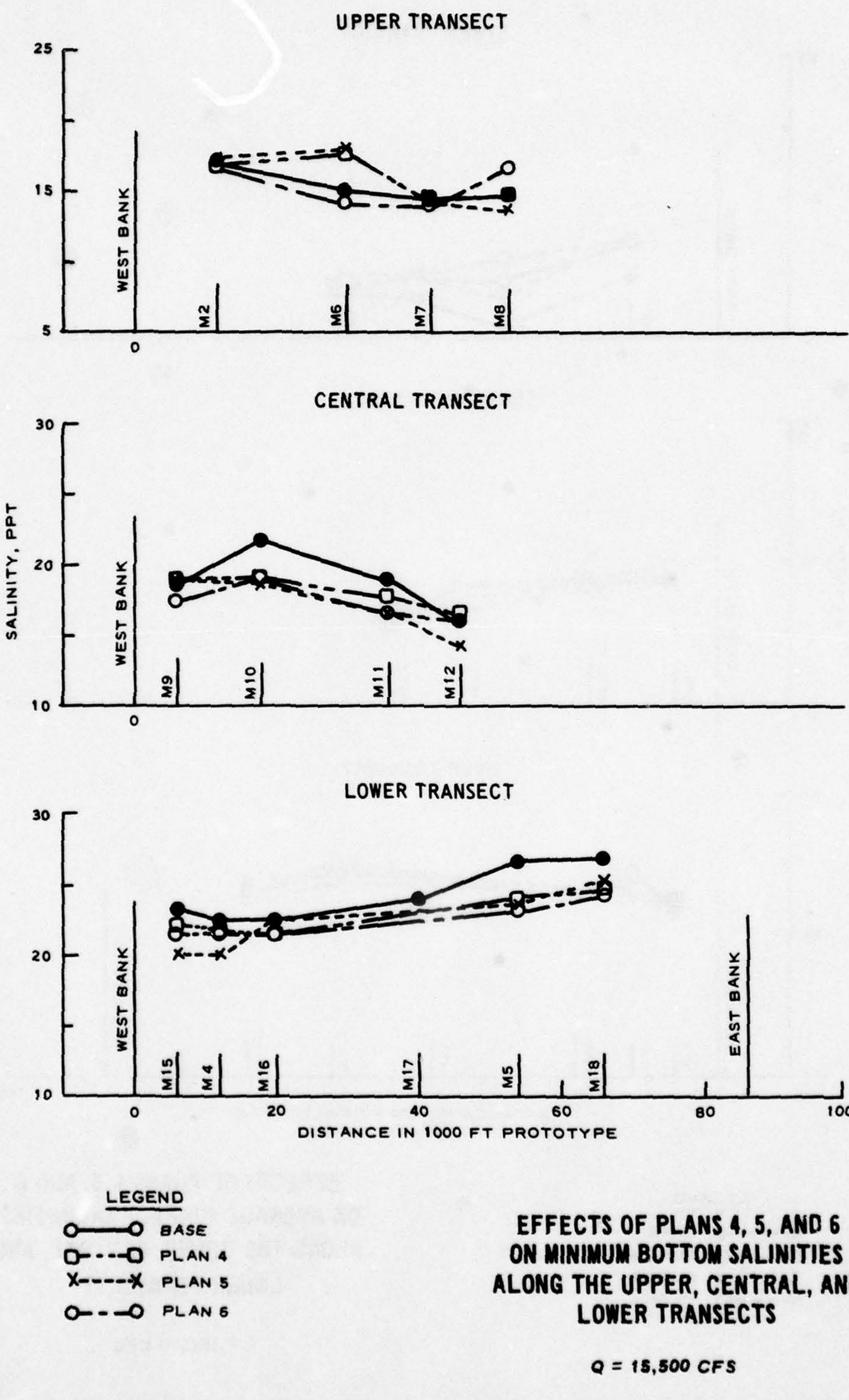

**EFFECTS OF PLANS 4, 5, AND 6 ON FLOW PREDOMINANCE**

Q = 15,500 CFS



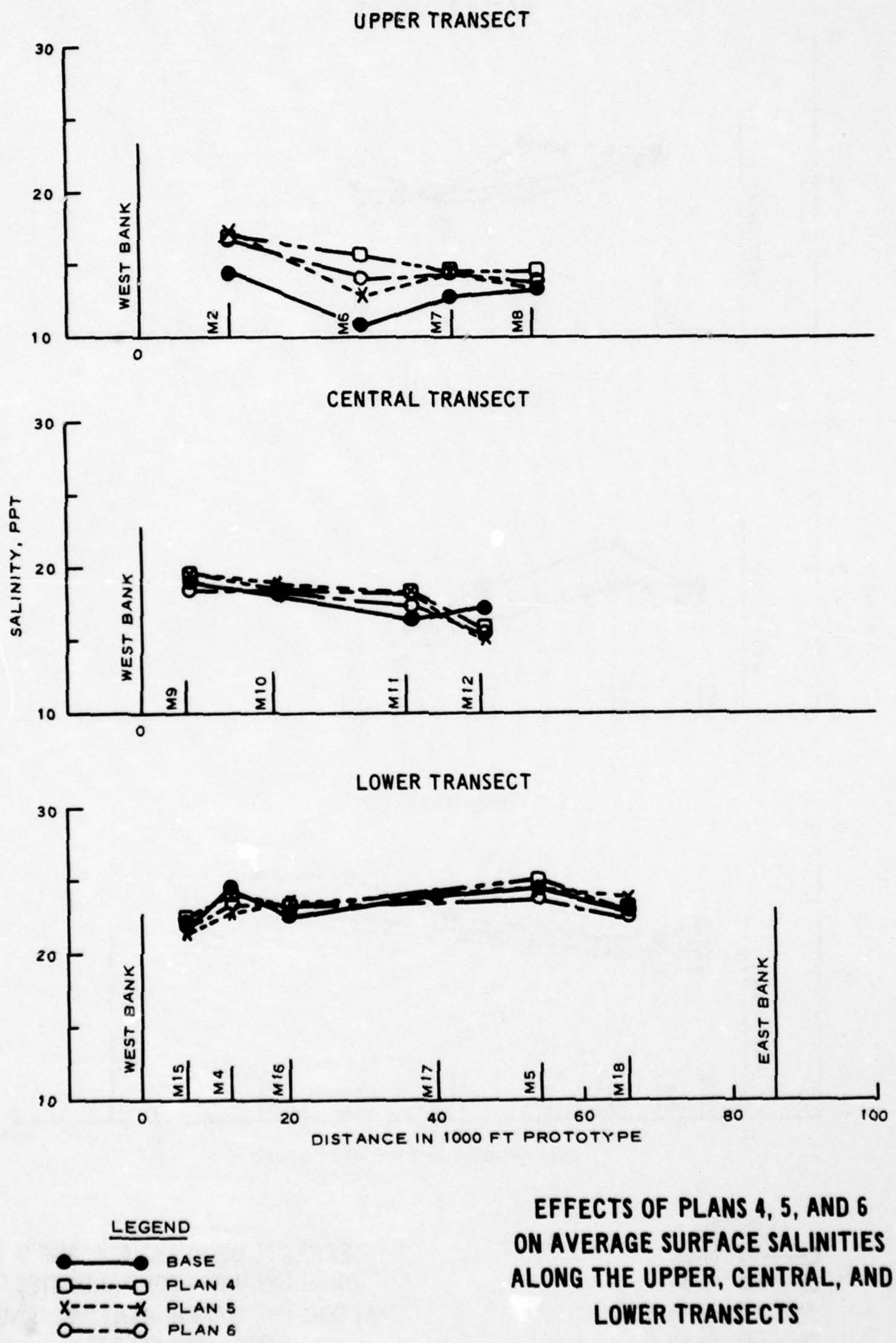

**EFFECTS OF PLANS 4, 5, AND 6 ON MINIMUM SURFACE SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 15,500 CFS



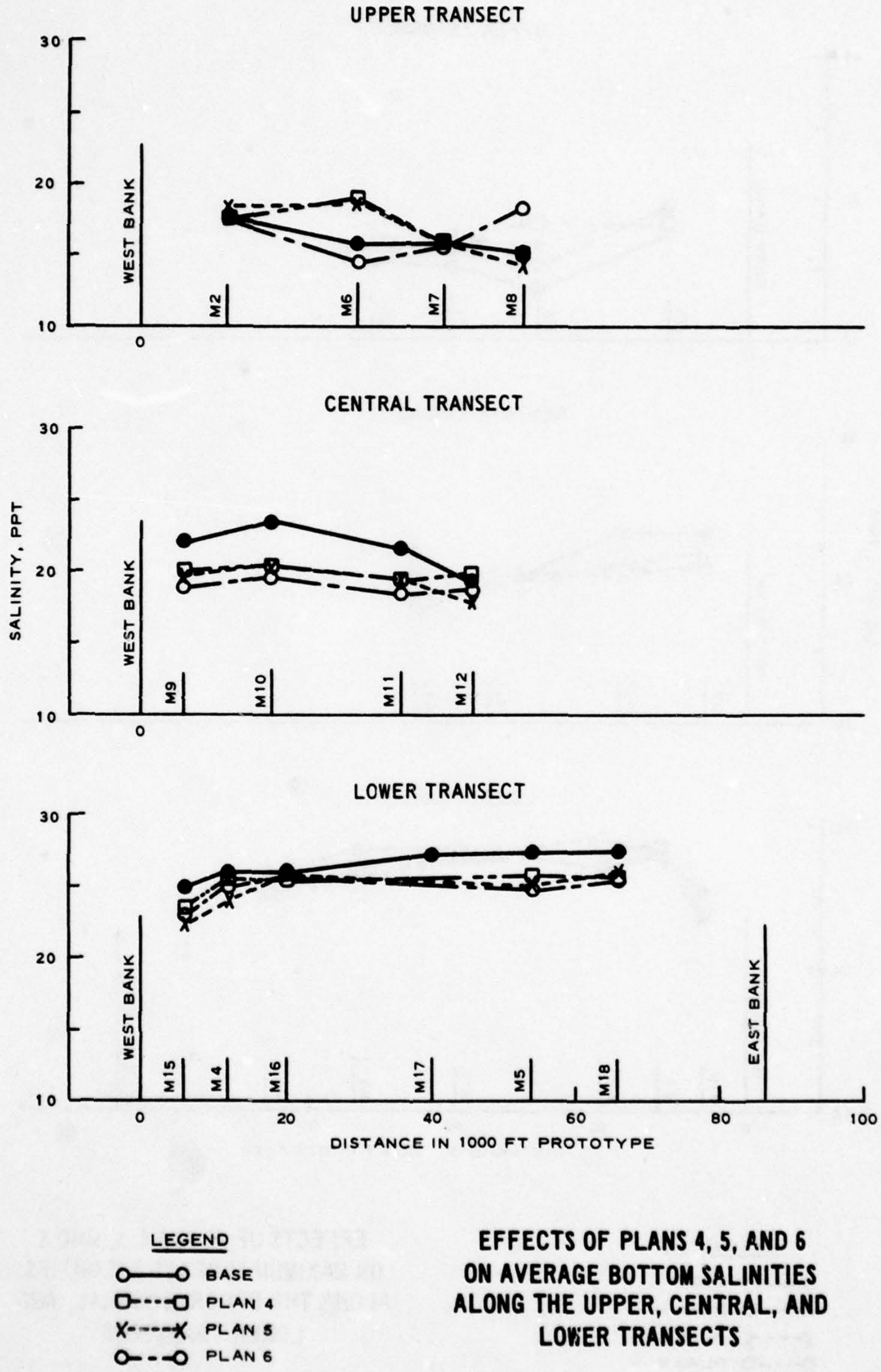

**EFFECTS OF PLANS 4, 5, AND 6 ON MINIMUM BOTTOM SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

*Q = 15,500 CFS*



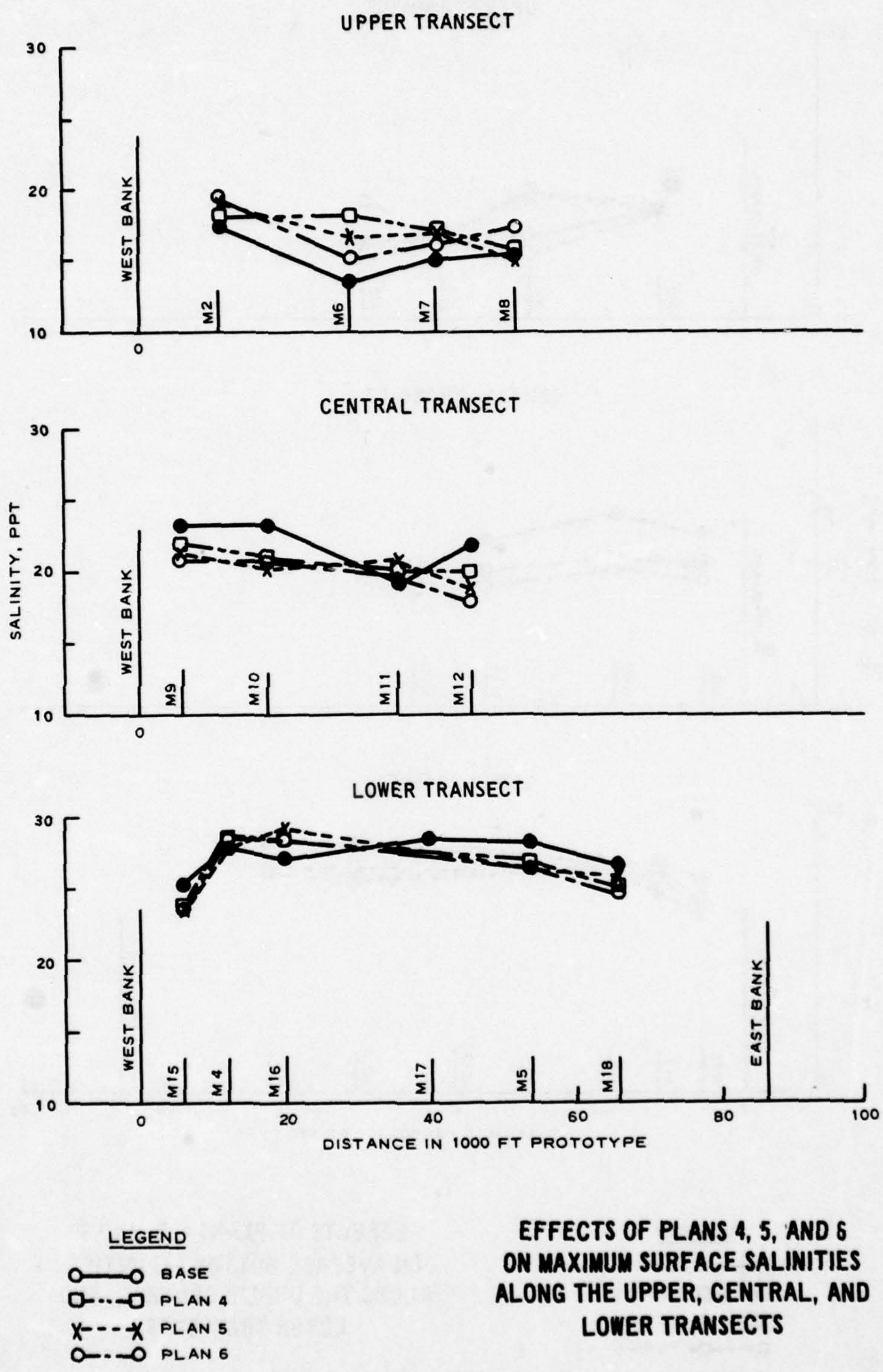

**EFFECTS OF PLANS 4, 5, AND 6 ON AVERAGE SURFACE SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 15,500 CFS



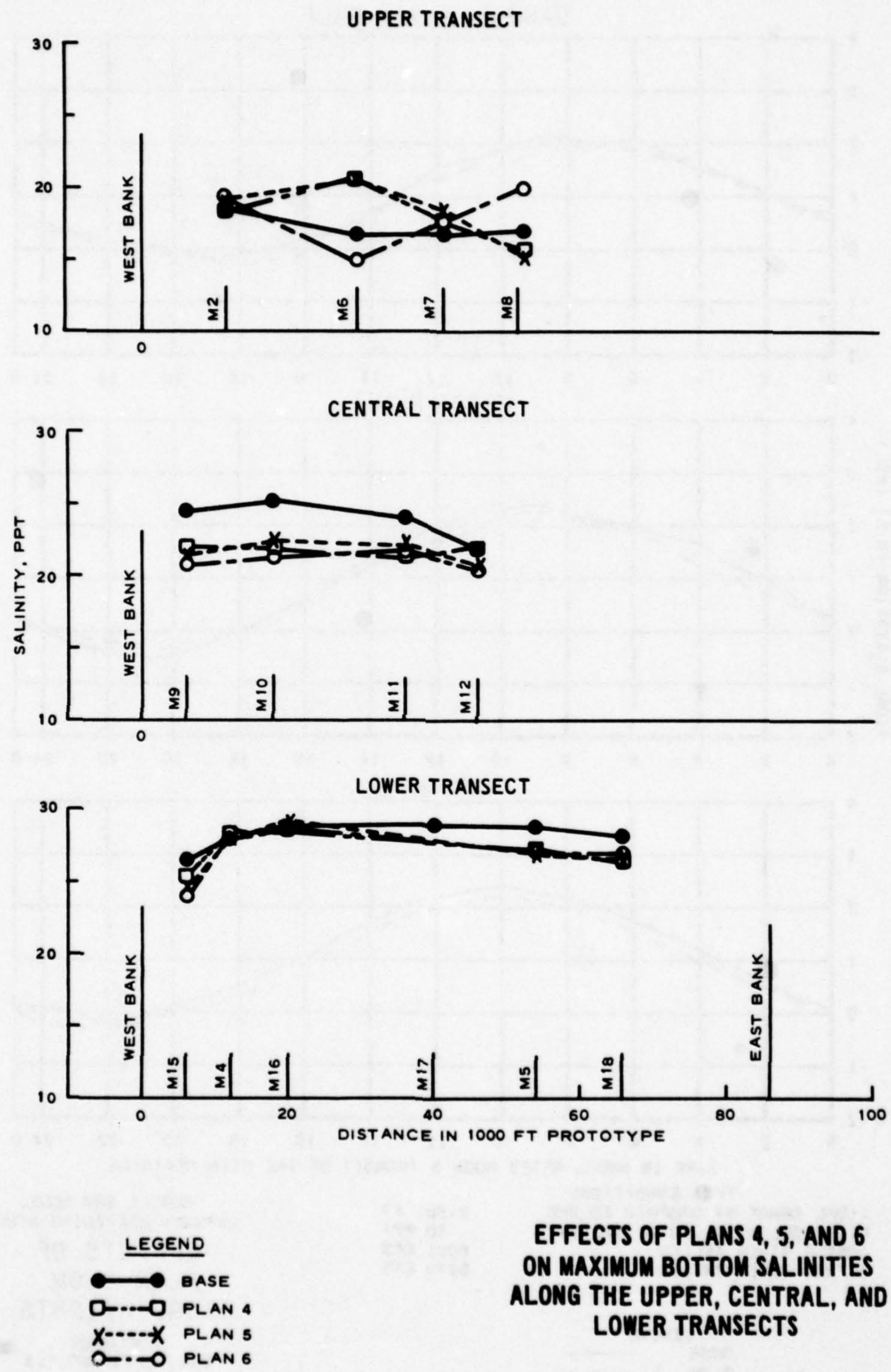

**EFFECTS OF PLANS 4, 5, AND 6 ON AVERAGE BOTTOM SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 15,500 CFS



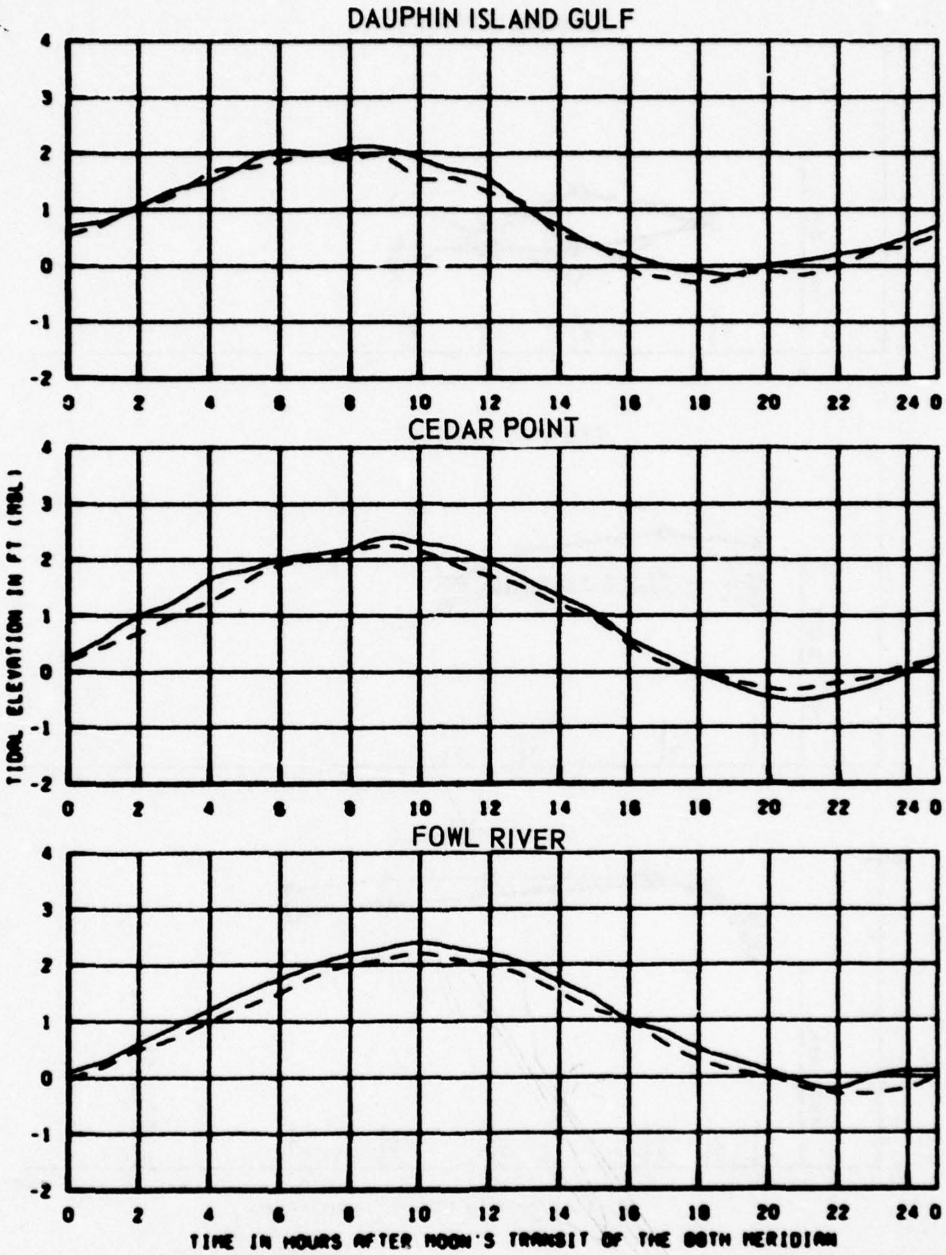

EFFECTS OF PLANS 4, 5, AND 6 ON MAXIMUM SURFACE SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS

Q = 15,500 CFS




**EFFECTS OF PLANS 4, 5, AND 6 ON MAXIMUM BOTTOM SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 15,500 CFS



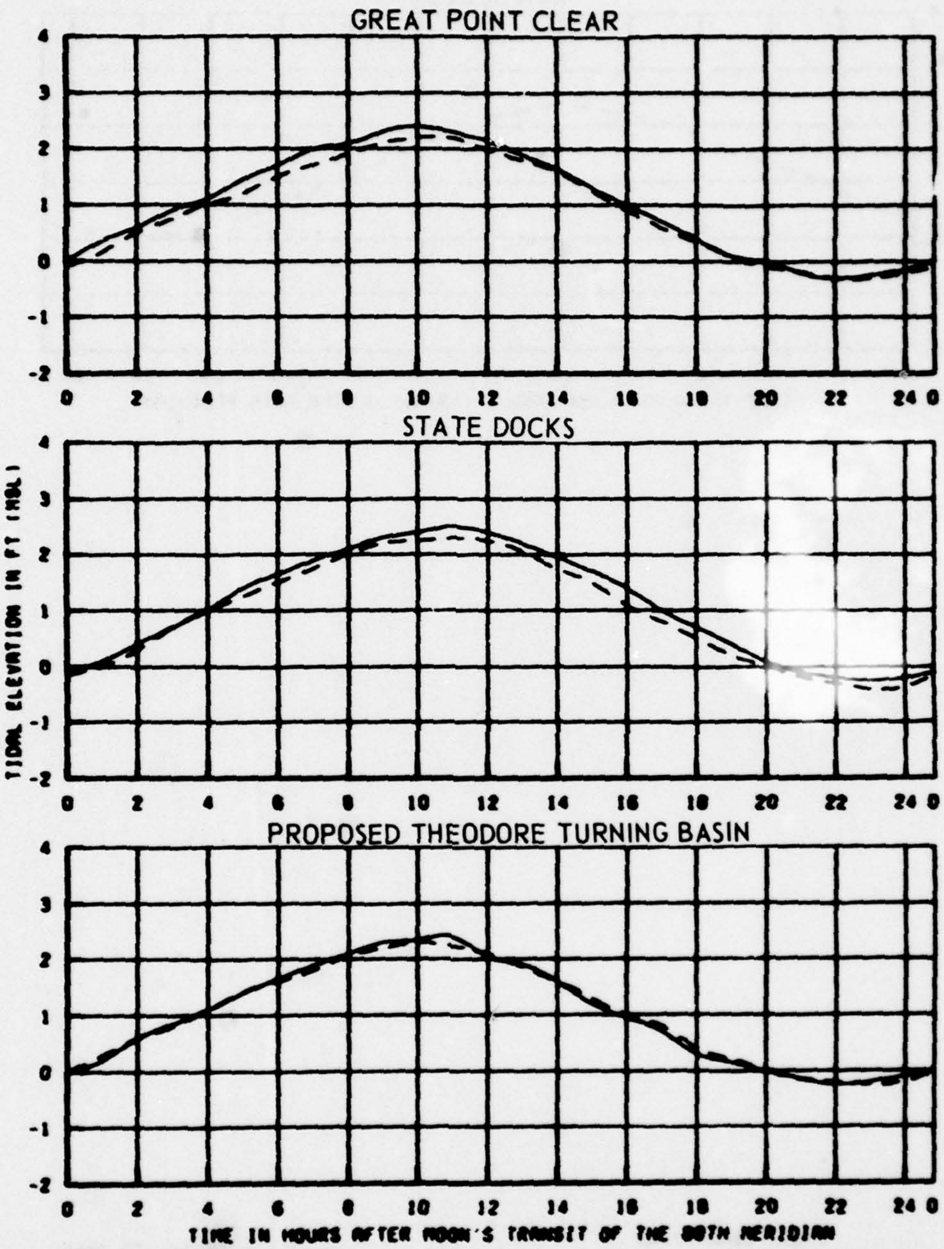

TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLAN 7 ON
TIDAL HEIGHTS

STATIONS
DIG, CPT, AND FLR




TEST CONDITIONS

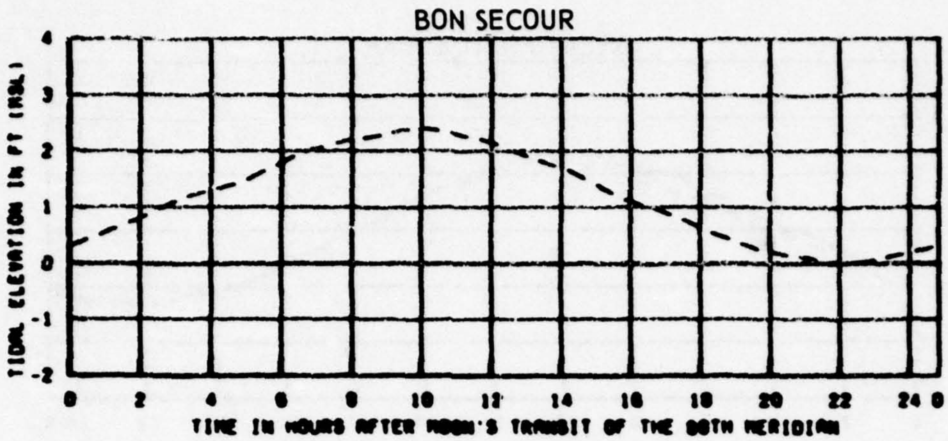
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ————
PLAN 7 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

**EFFECTS OF PLAN 7 ON TIDAL HEIGHTS**

STATIONS
GPC, SD, AND TB




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND

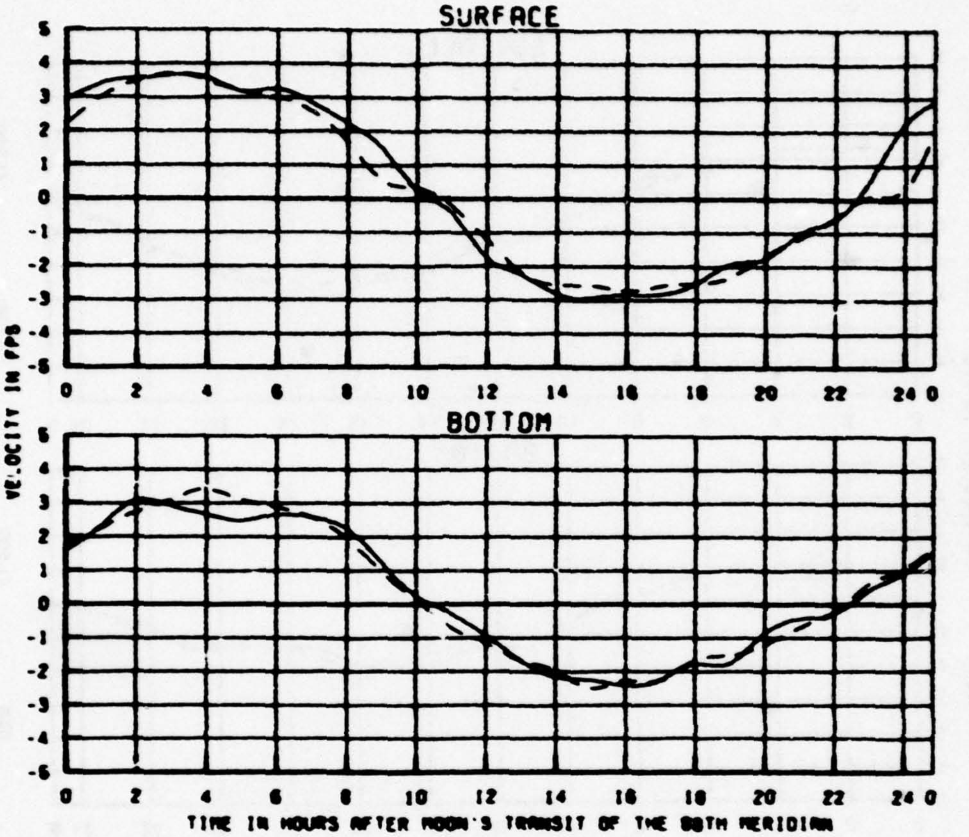
PLAN 7 — — —

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLAN 7 ON
TIDAL HEIGHTS

STATION
BNS

PLATE 52




TEST CONDITIONS

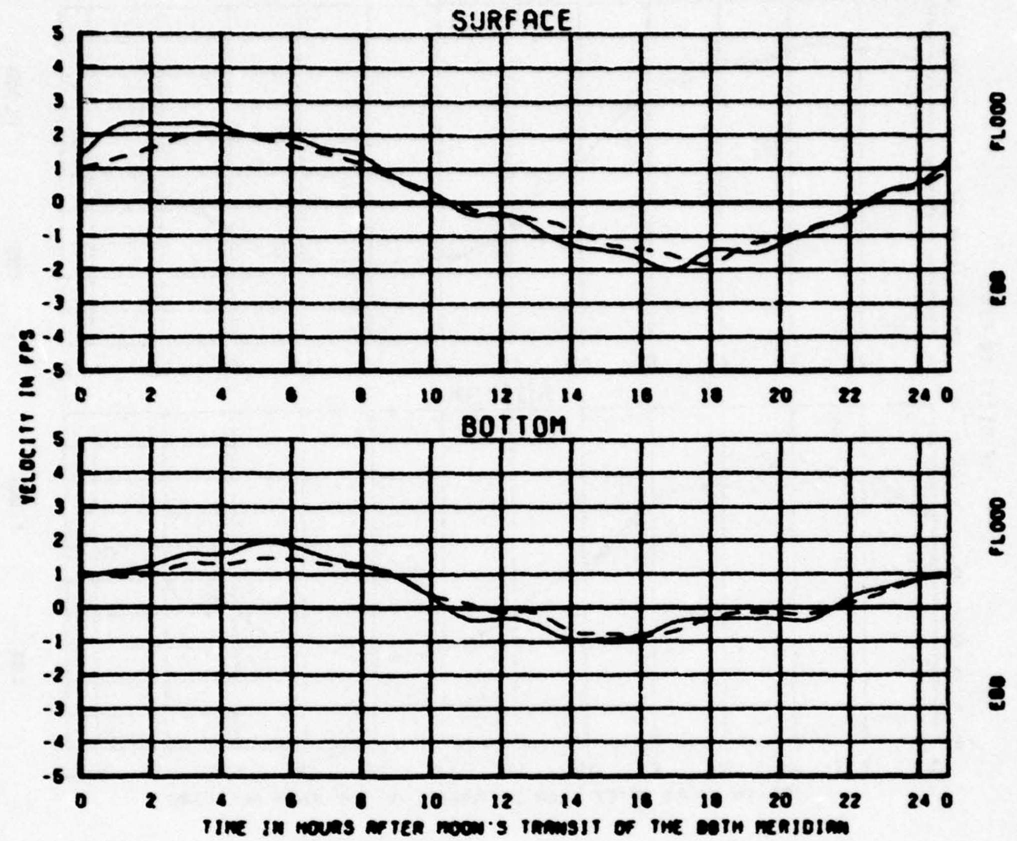
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 7 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLAN 7 ON
VELOCITIES

STATION
1



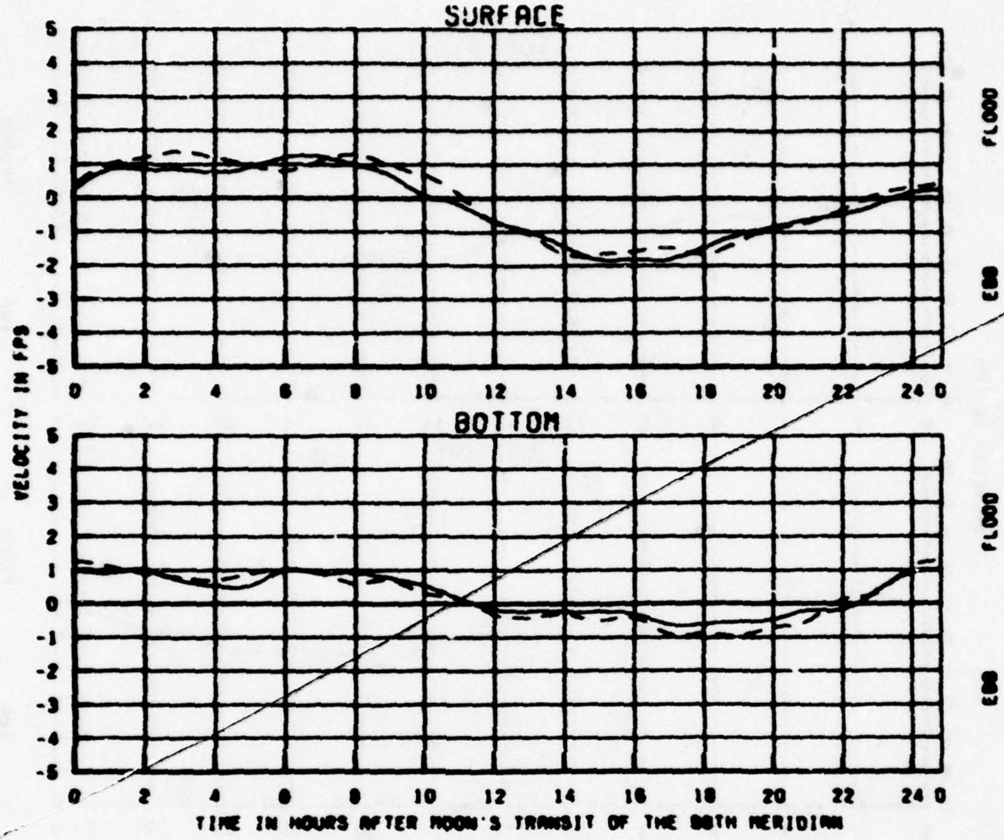

| TEST CONDITIONS | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 7 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 7 ON VELOCITIES

STATION 2




TEST CONDITIONS

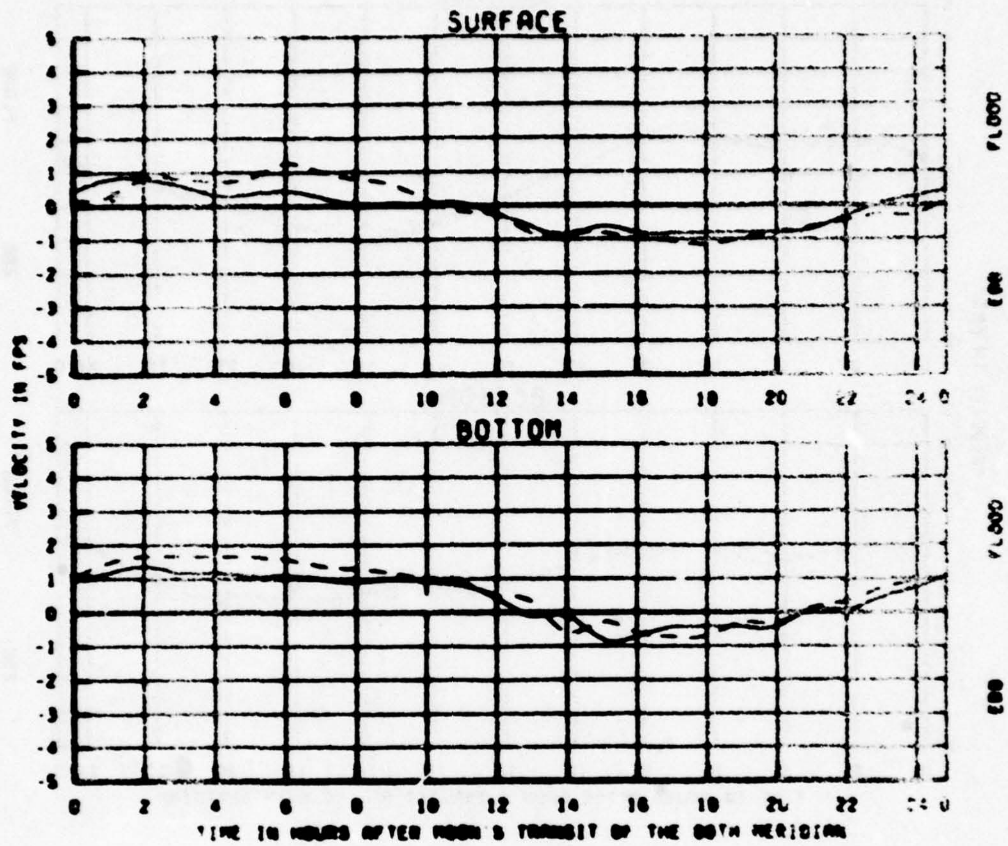
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 7 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 7 ON VELOCITIES

STATION 3




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 8021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND

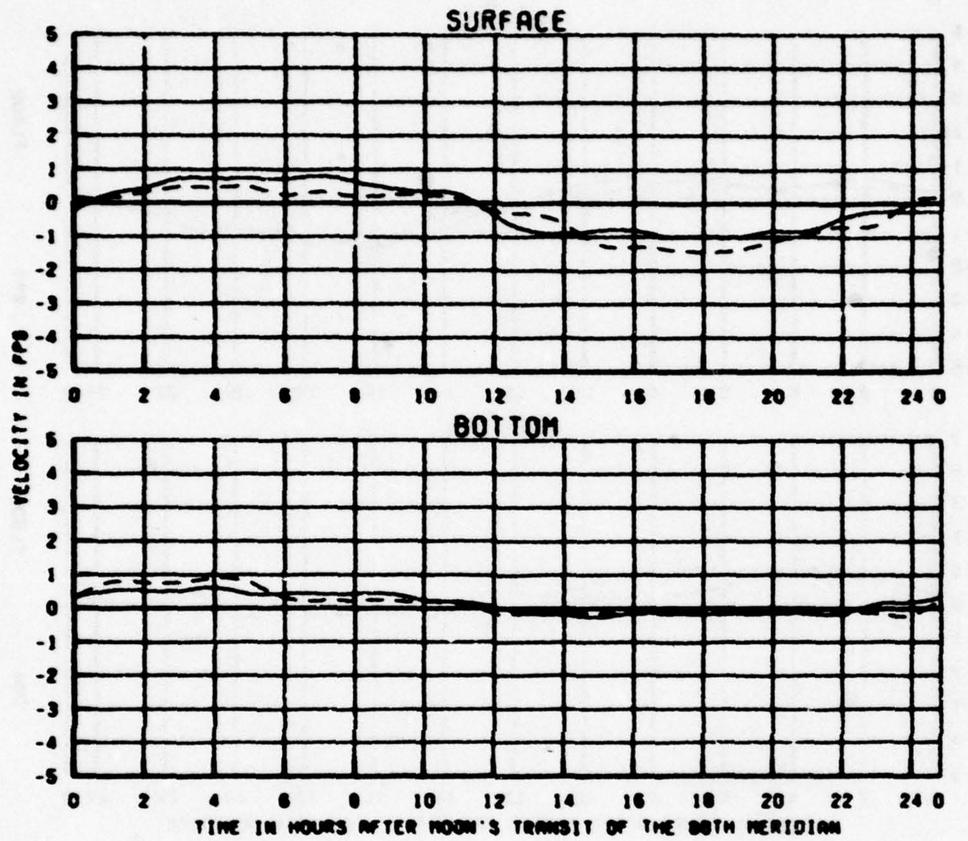
BASE ———

PLAN 7 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 7 ON VELOCITIES

STATION 4



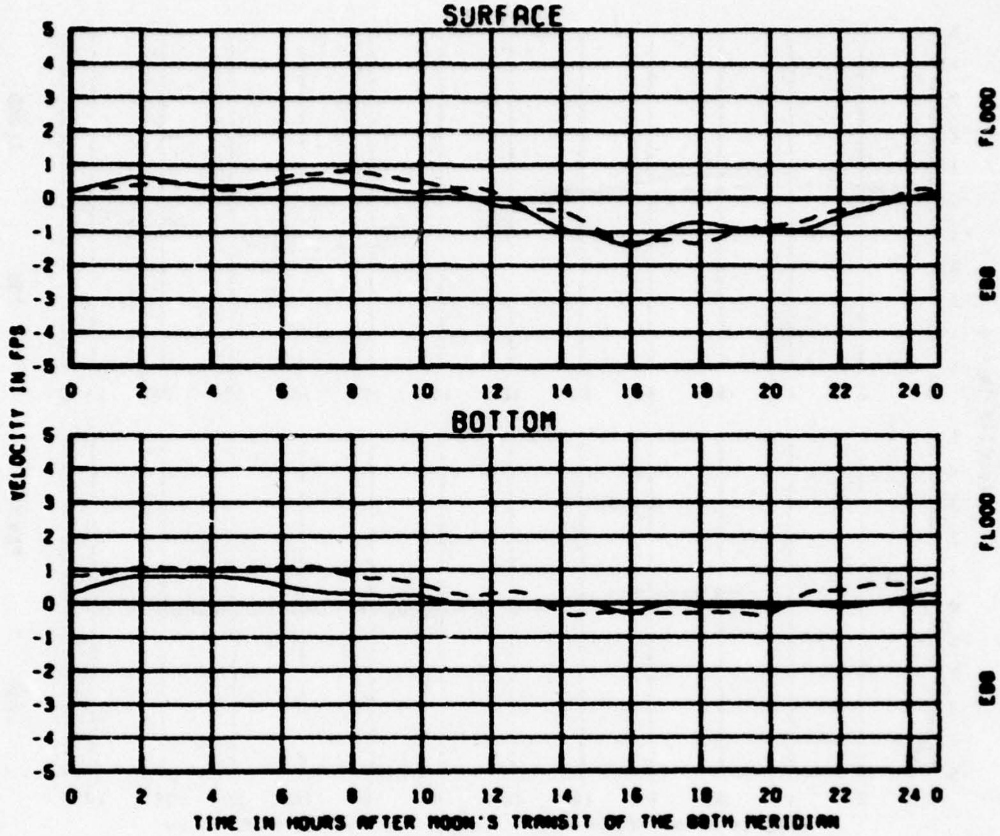

| TEST CONDITIONS | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 7 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 7 ON VELOCITIES

STATION
6




TEST CONDITIONS

| | | |
|---|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 9021 | CFS |
| TENSAW RIVER INFLOW | 6479 | CFS |

LEGEND

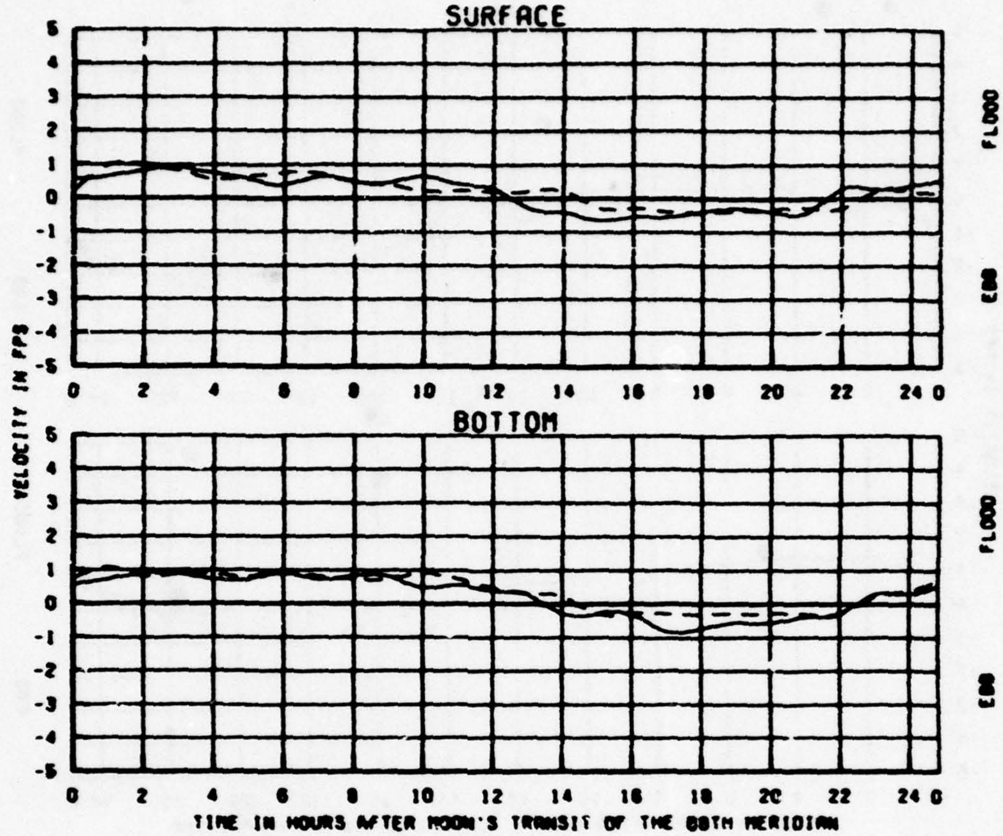
BASE ———

PLAN 7 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 7 ON VELOCITIES

STATION
6




TEST CONDITIONS

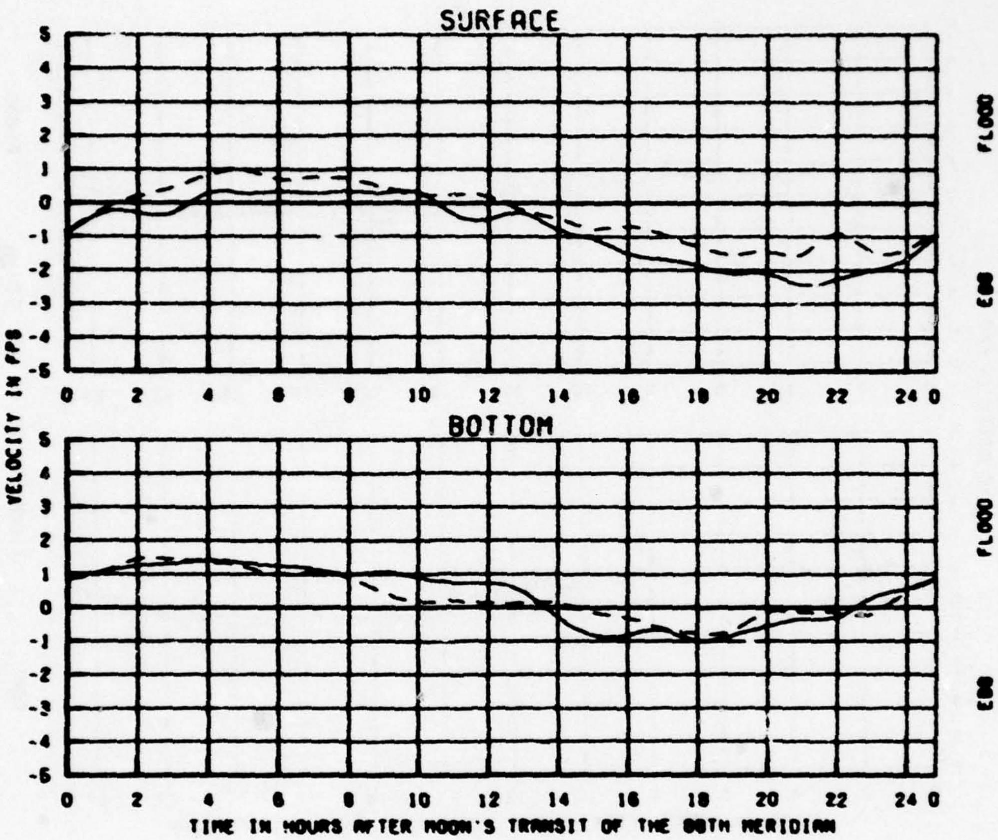
| | | |
|---|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 9021 | CFS |
| TENSAW RIVER INFLOW | 6479 | CFS |

LEGEND
BASE ———
PLAN 7 - - -

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLAN 7 ON
VELOCITIES

STATION
7




TEST CONDITIONS

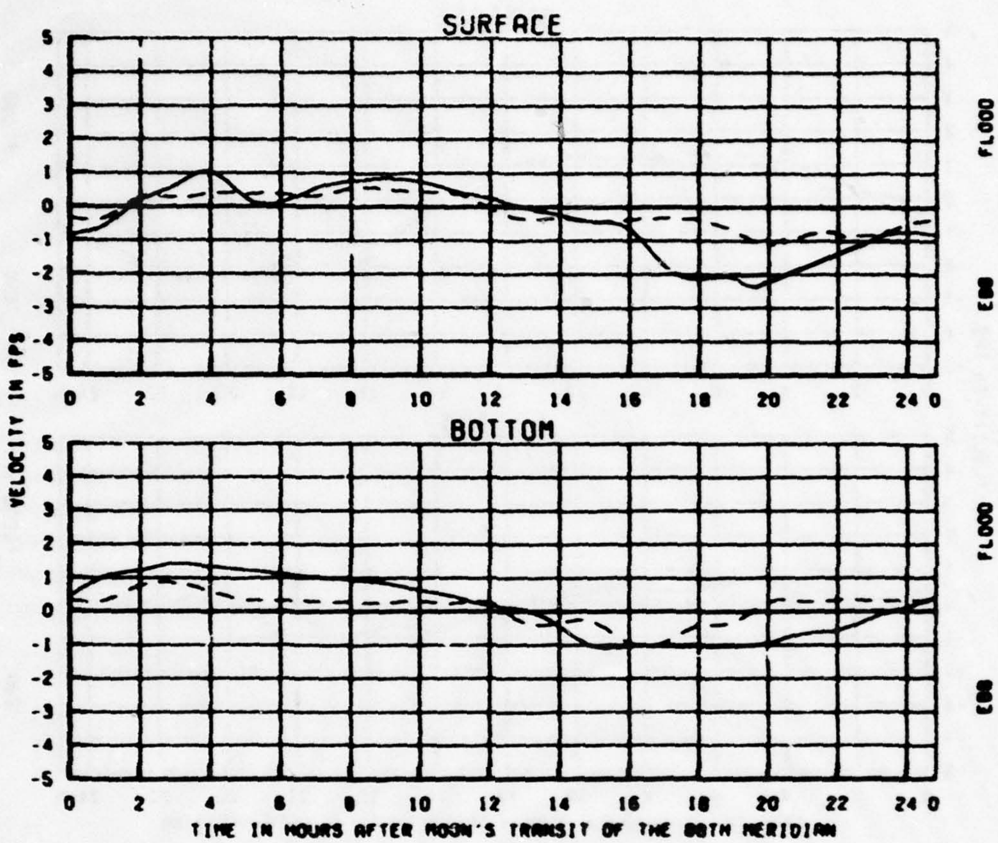
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 7 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLAN 7 ON
VELOCITIES

STATION
8




TEST CONDITIONS

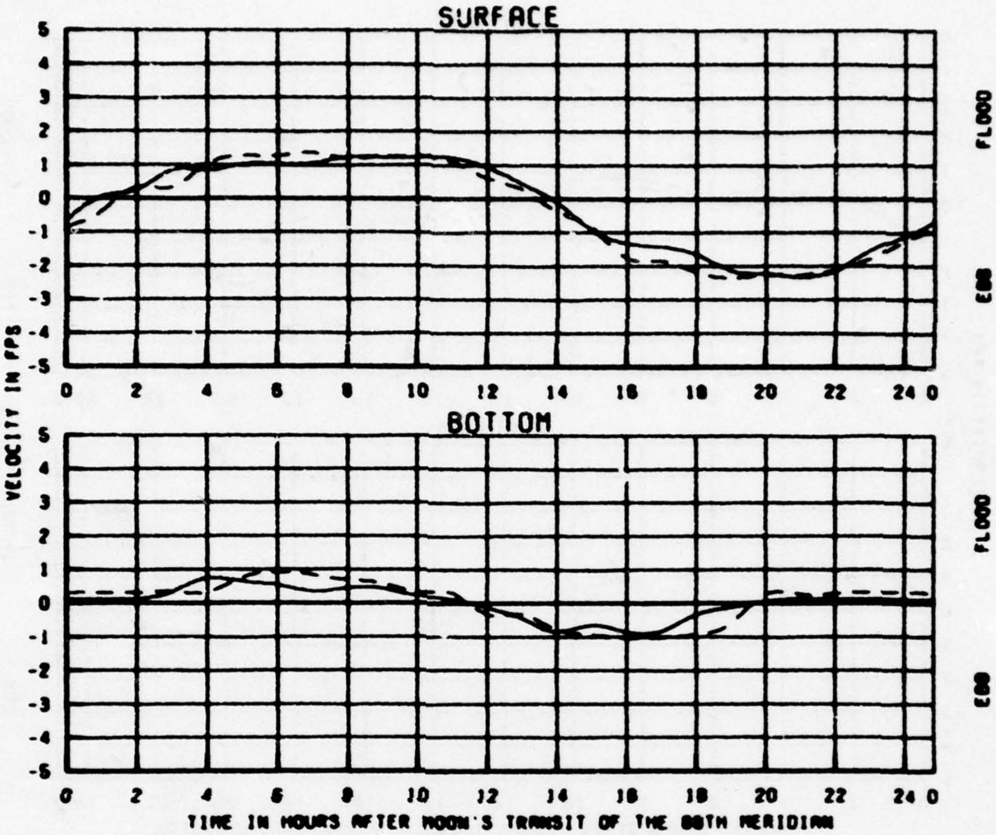
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 7 — — —

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 7 ON VELOCITIES

STATION
9




TEST CONDITIONS

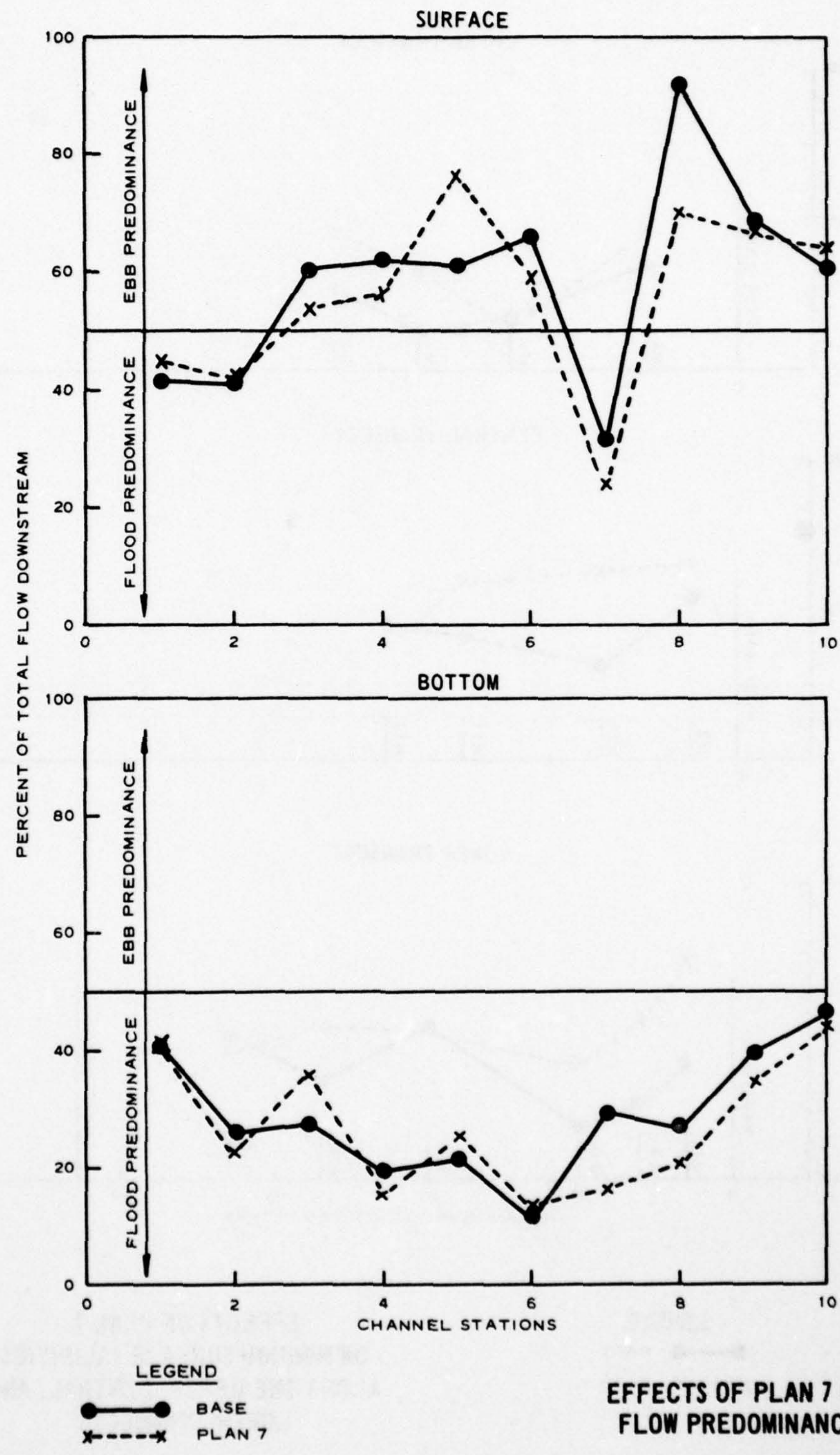
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 9021 CFS |
| TENSAW RIVER INFLOW | 6479 CFS |

LEGEND
BASE ———
PLAN 7 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

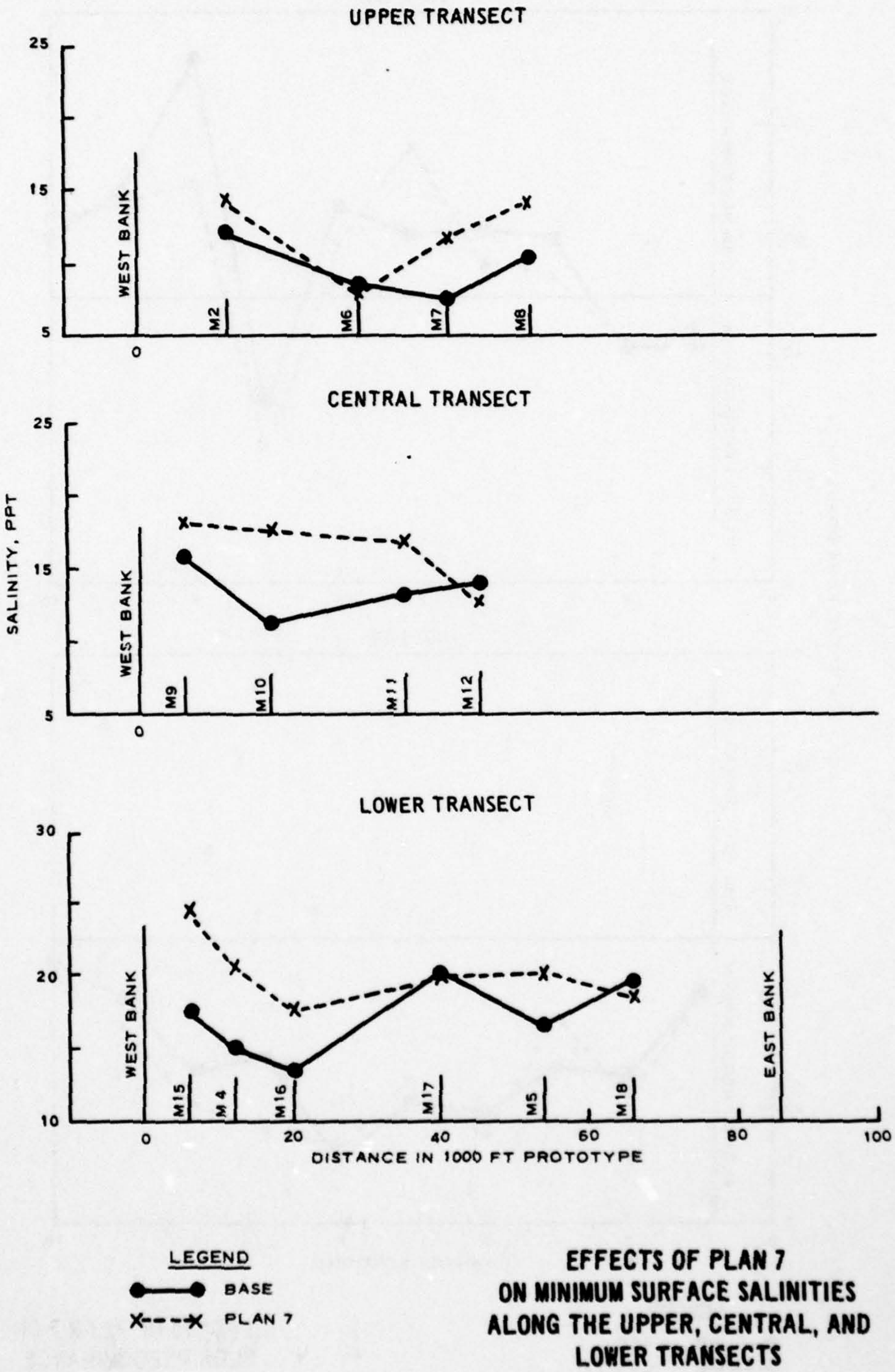
EFFECTS OF
PLAN 7 ON
VELOCITIES

STATION
10



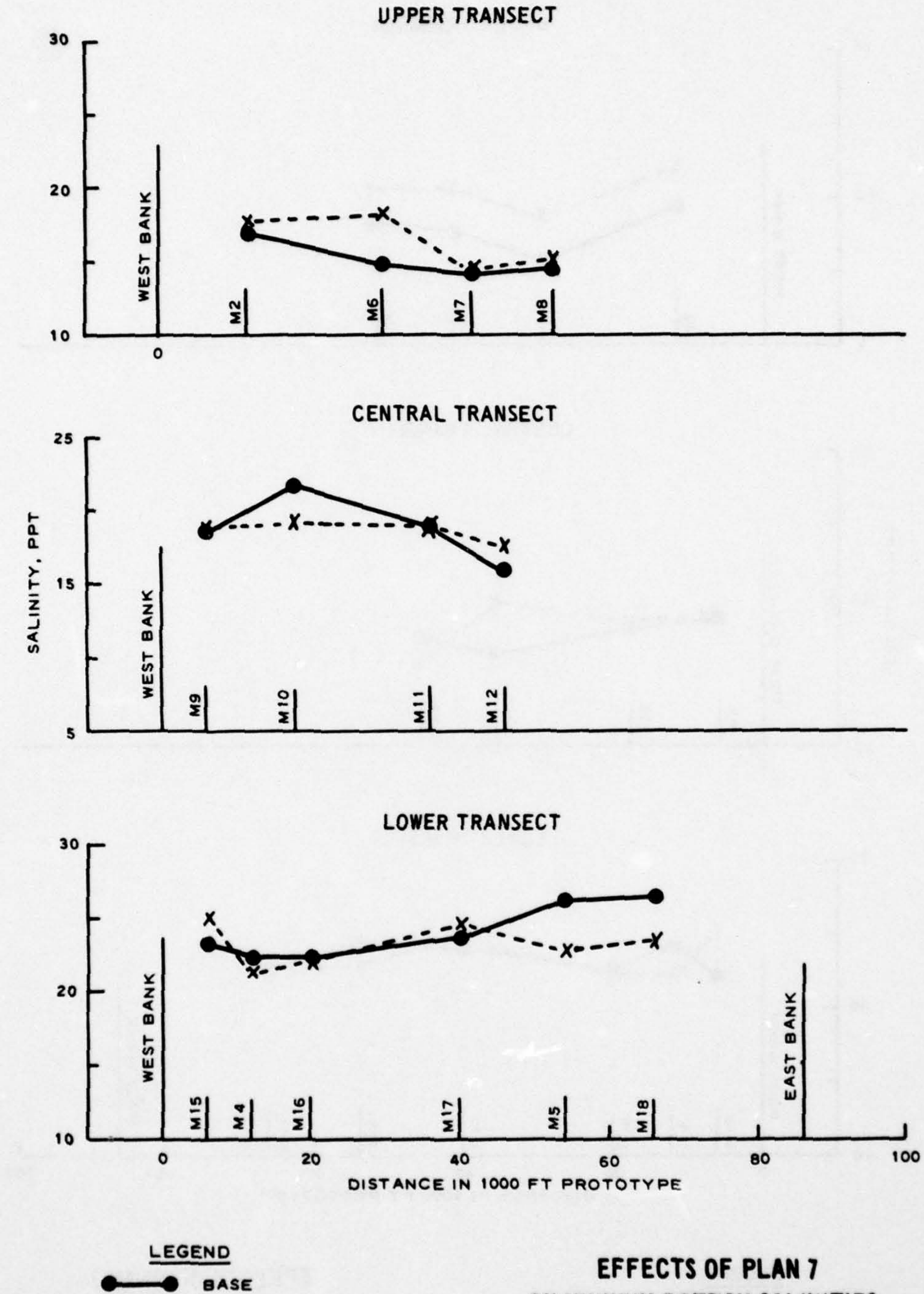

**EFFECTS OF PLAN 7 ON FLOW PREDOMINANCE**

Q = 15,500 CFS



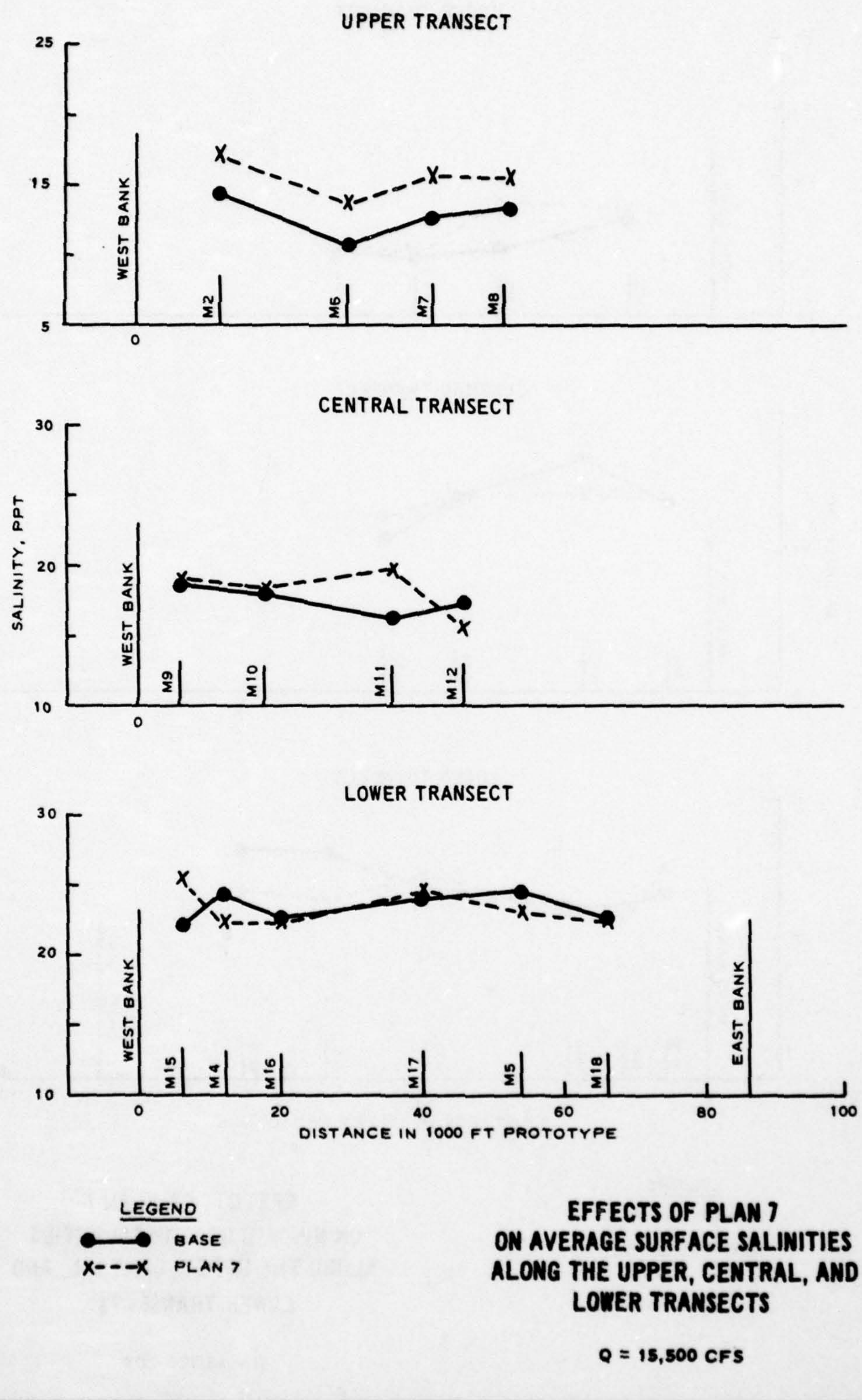

EFFECTS OF PLAN 7
ON MINIMUM SURFACE SALINITIES
ALONG THE UPPER, CENTRAL, AND
LOWER TRANSECTS

Q = 15,500 CFS



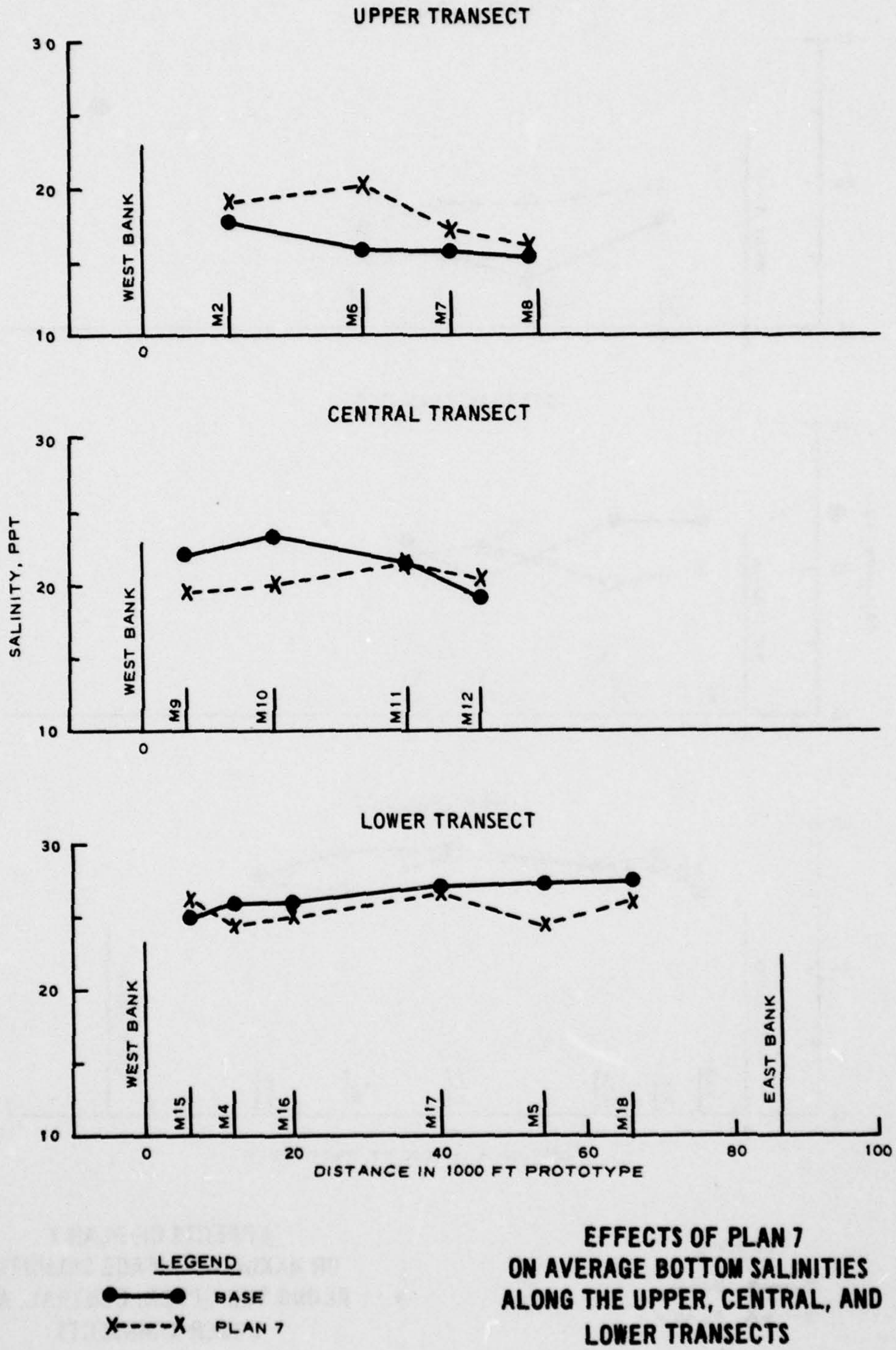

**EFFECTS OF PLAN 7 ON MINIMUM BOTTOM SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 15,500 CFS



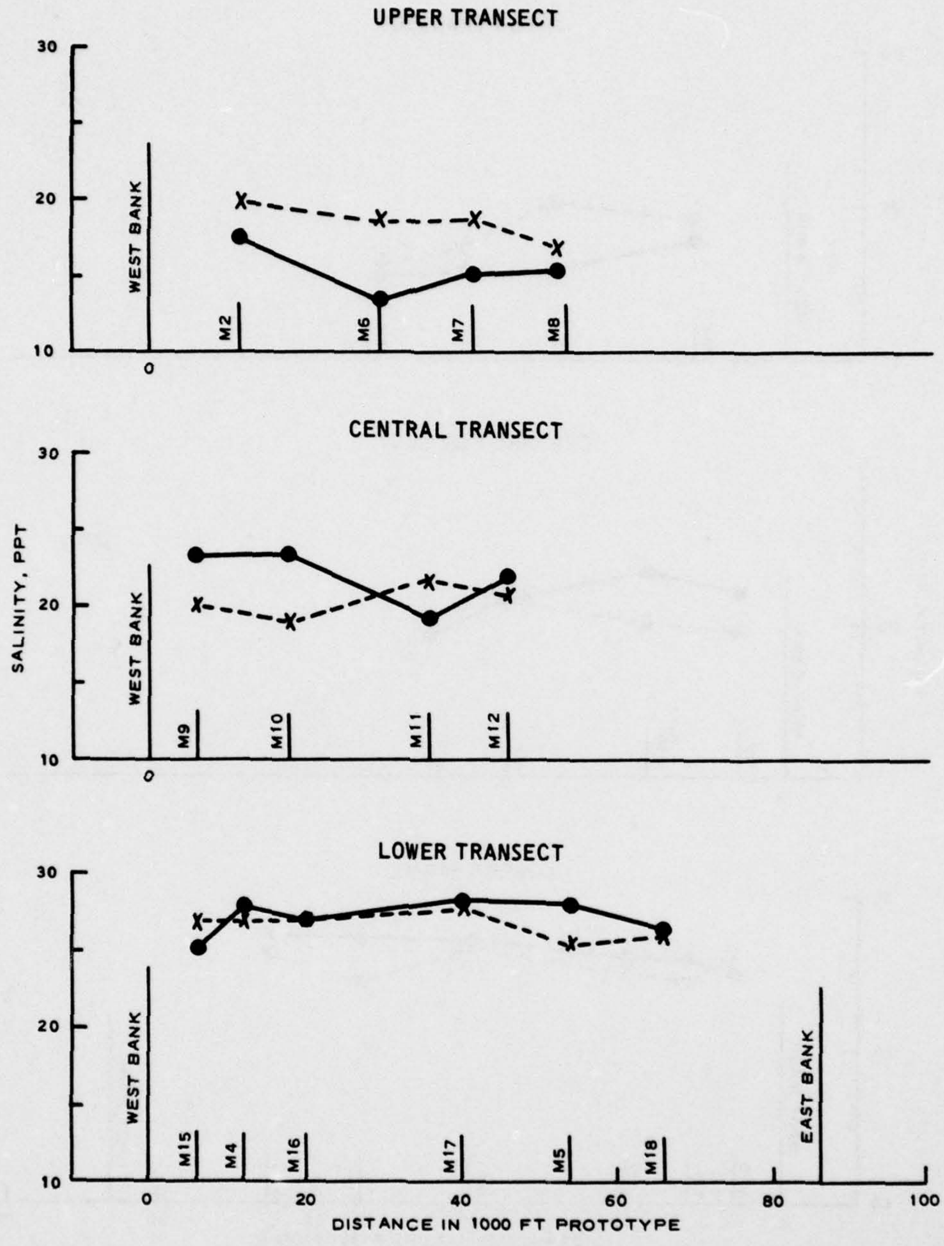

**EFFECTS OF PLAN 7 ON AVERAGE SURFACE SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 15,500 CFS



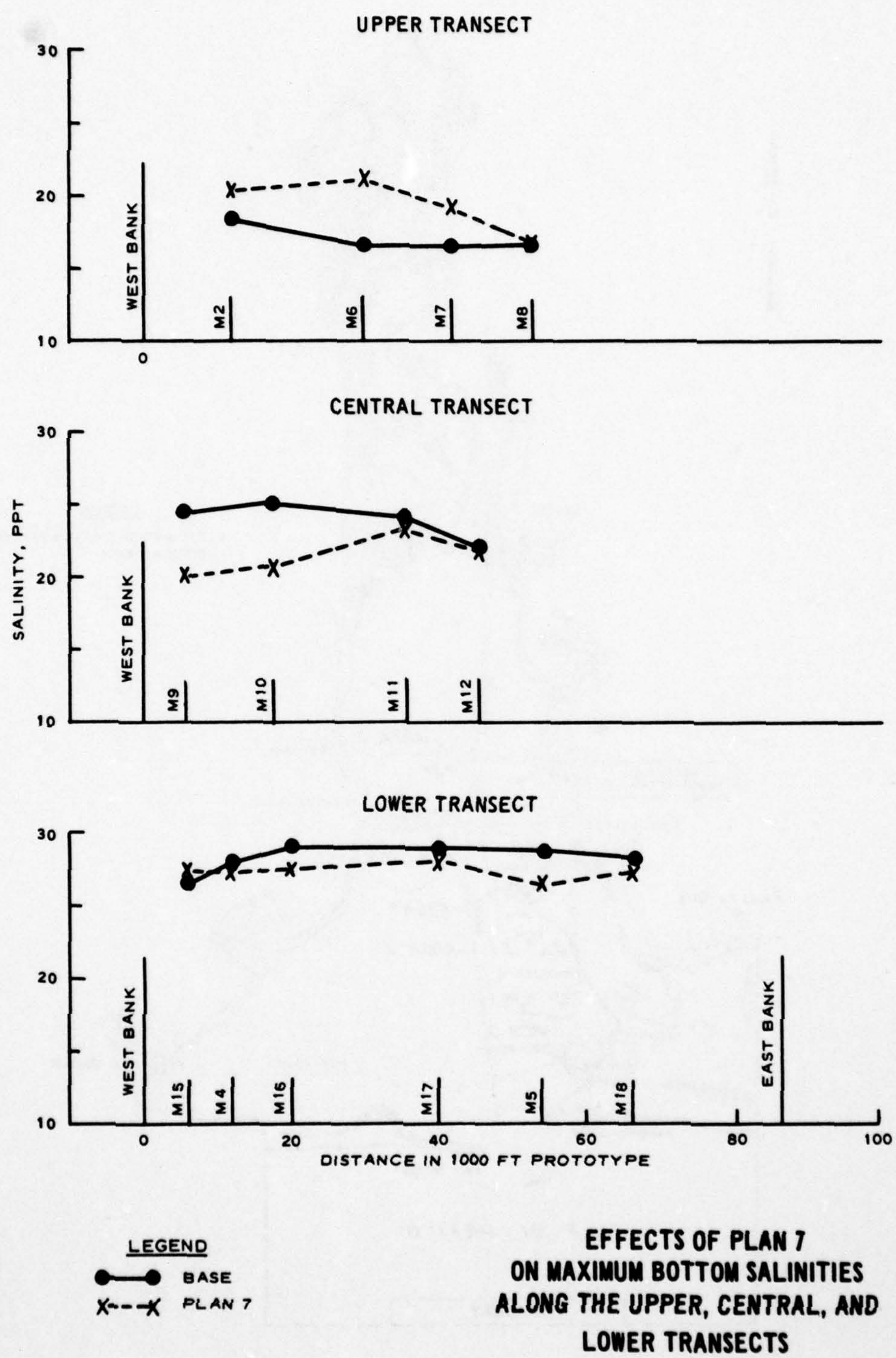

**EFFECTS OF PLAN 7**
**ON AVERAGE BOTTOM SALINITIES**
**ALONG THE UPPER, CENTRAL, AND**
**LOWER TRANSECTS**

Q= 15,500 CFS



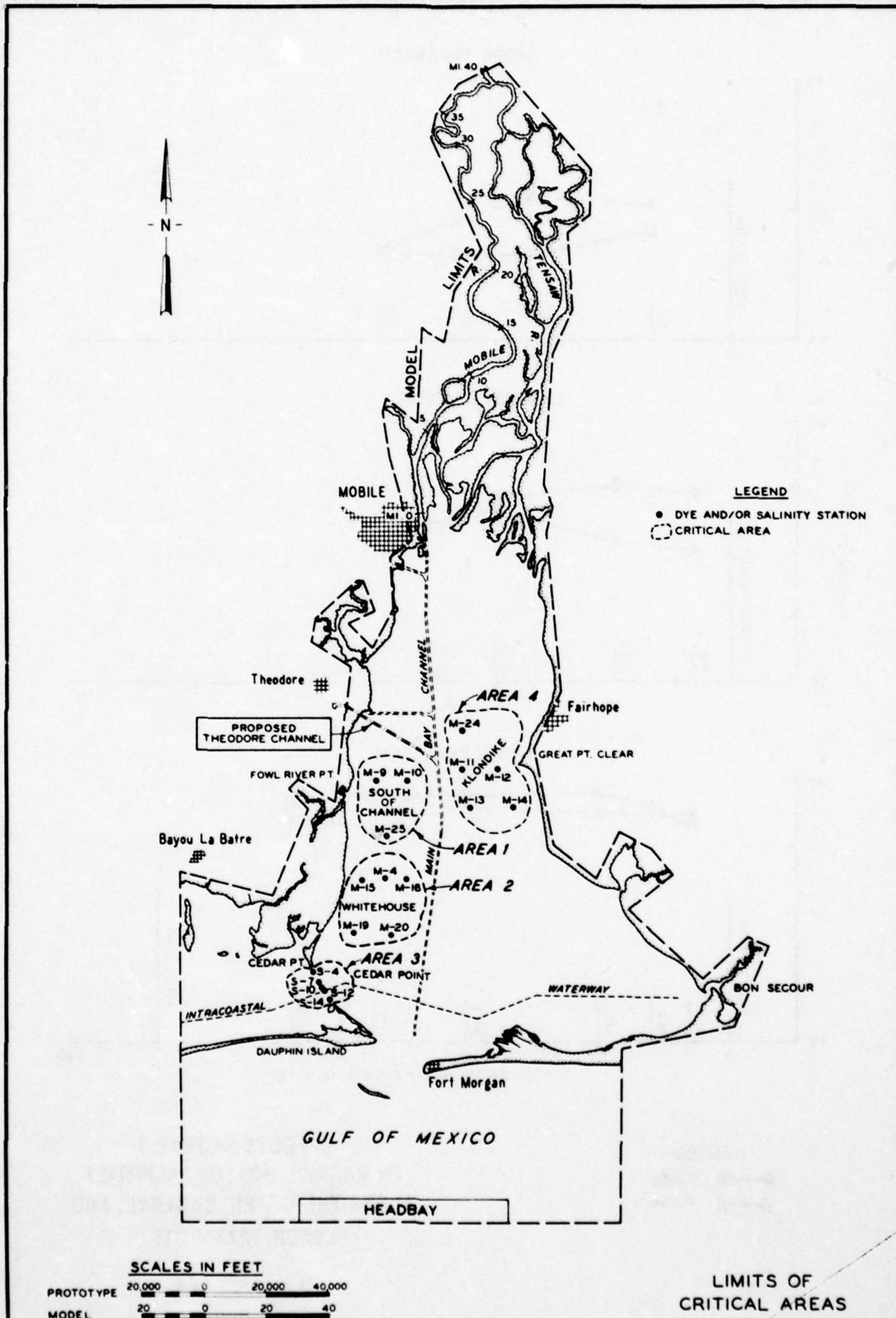

EFFECTS OF PLAN 7
ON MAXIMUM SURFACE SALINITIES
ALONG THE UPPER, CENTRAL, AND
LOWER TRANSECTS

Q = 15,500 CFS



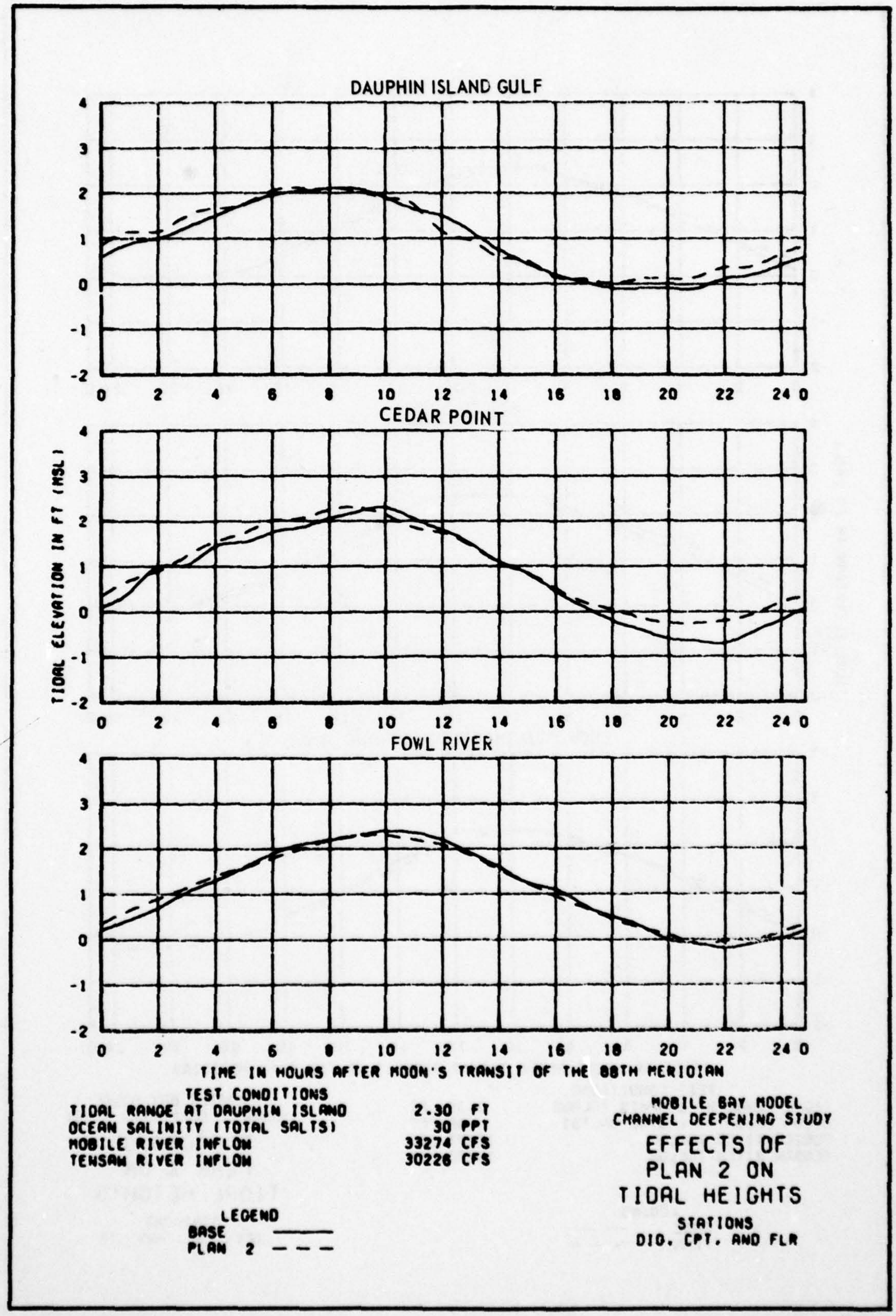

**EFFECTS OF PLAN 7 ON MAXIMUM BOTTOM SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 15,500 CFS



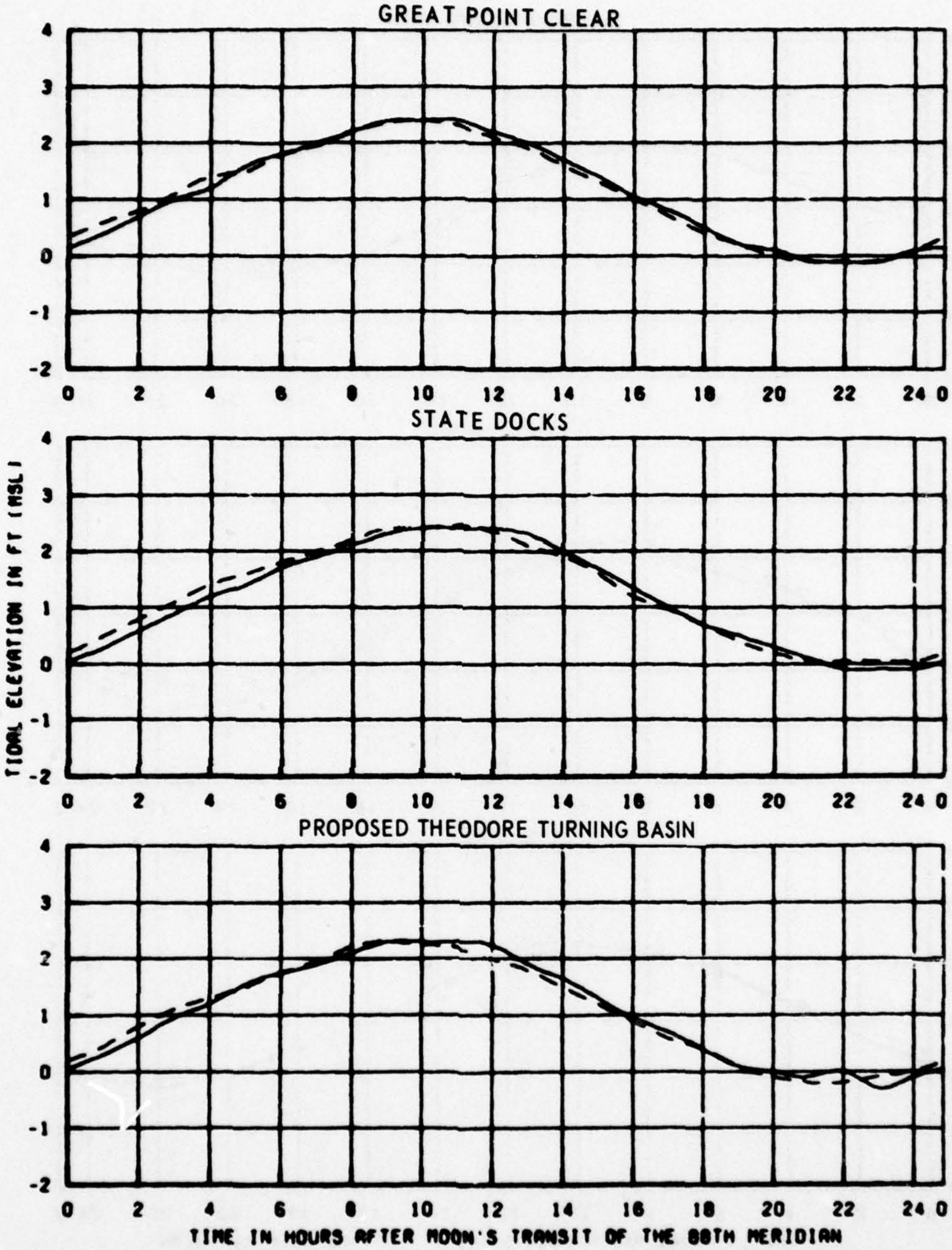

LIMITS OF CRITICAL AREAS

PLATE 70



DAUPHIN ISLAND GULF
CEDAR POINT
FOWL RIVER
TIDAL ELEVATION IN FT (MSL)
4
3
2
1
0
-1
-2
0
2
4
6
8
10
12
14
16
18
20
22
24 0
TIME IN HOURS AFTER MOON'S TRANSIT OF THE 88TH MERIDIAN
TEST CONDITIONS
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
BASE
PLAN 2
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
EFFECTS OF
PLAN 2 ON
TIDAL HEIGHTS
STATIONS
DIG. CPT. AND FLR


PLATE 71




TEST CONDITIONS

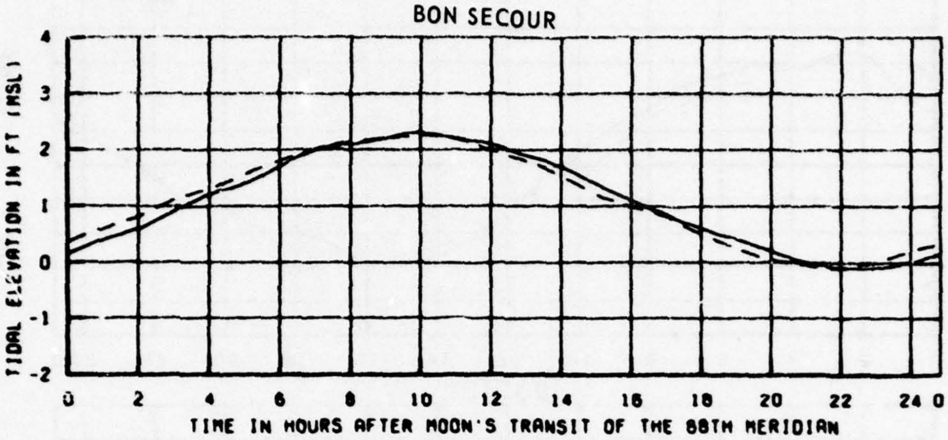
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND
BASE ———
PLAN 2 — — —

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLAN 2 ON
TIDAL HEIGHTS

STATIONS
GPC, SD, AND TB




TEST CONDITIONS

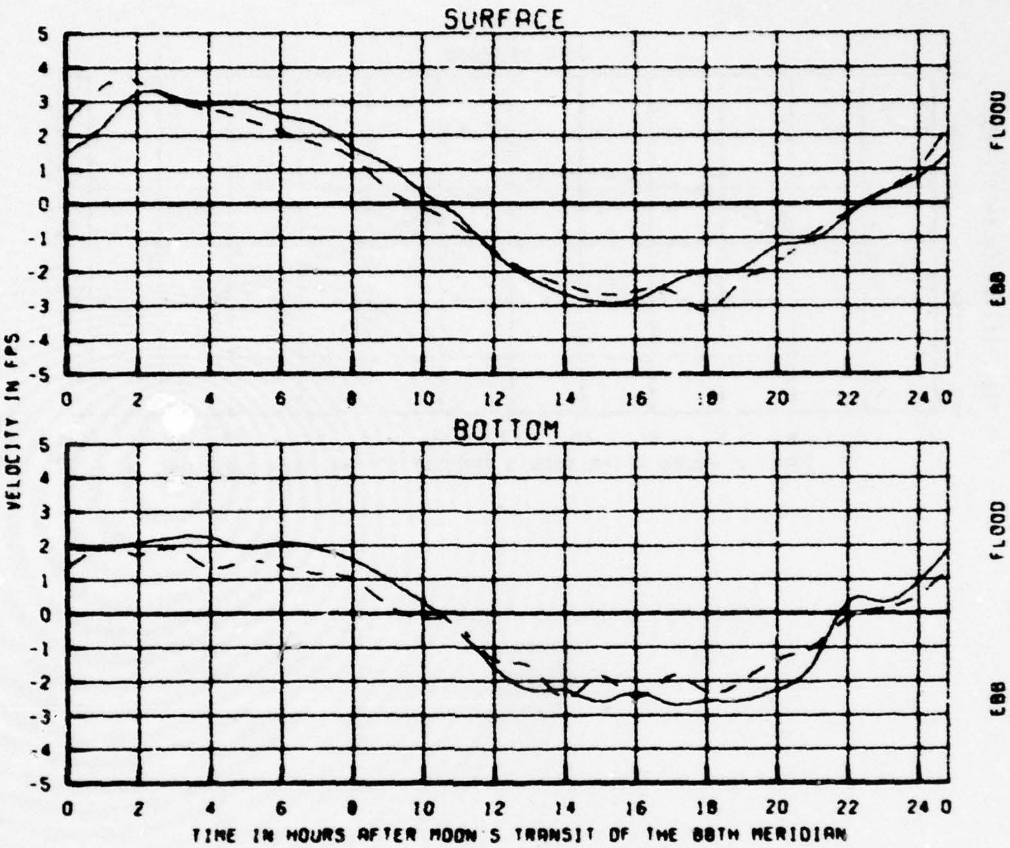
| | | |
|---|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 33274 | CFS |
| TENSAW RIVER INFLOW | 30226 | CFS |

LEGEND
BASE ————
PLAN 2 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLAN 2 ON
TIDAL HEIGHTS

STATION
BNS




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND
BASE ———
PLAN 2 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

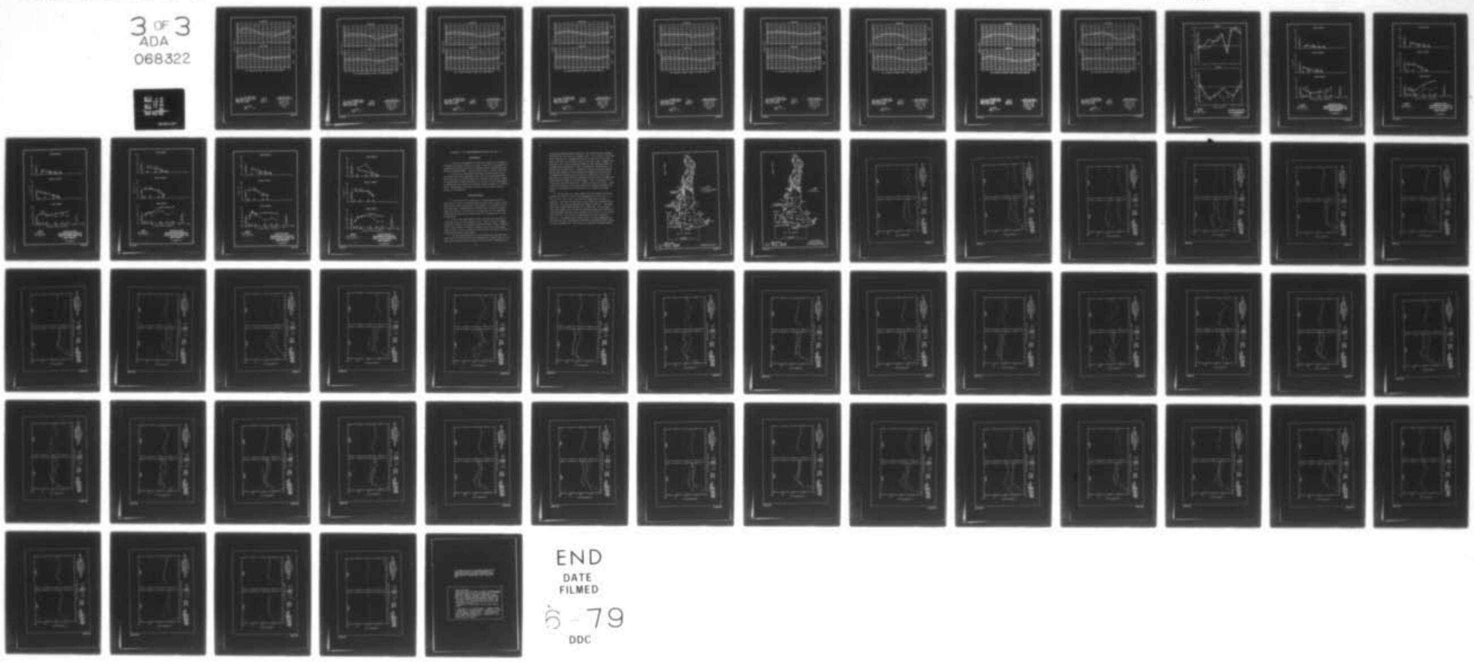
EFFECTS OF
PLAN 2 ON
VELOCITIES

STATION
1

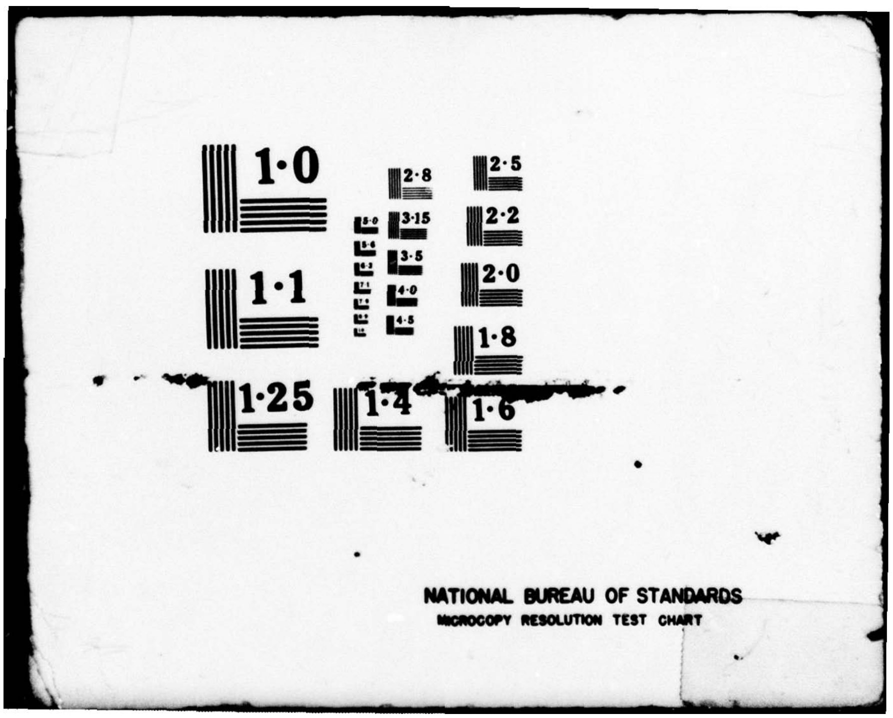
AD-A068 322 ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS F/G 8/8
MOBILE BA MODEL STUDY. REPORT 2. EFFECTS OF ENLARGED NAVIGATION--ETC(U)
MAR 79 R C BERGER, R A BOLAND

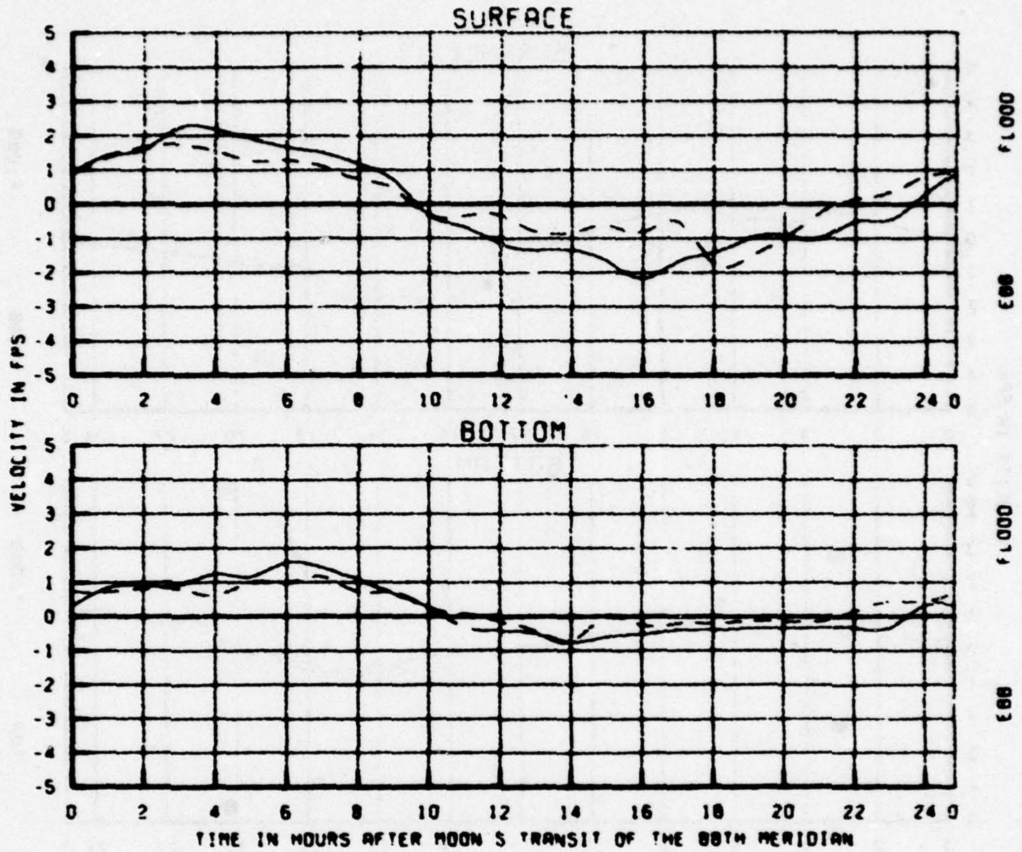
UNCLASSIFIED WES-TR-H-75-13-2 NL

3 OF 3
ADA
068322



END
DATE
FILMED
6-79
DDC


1·0
2·8
2·5
5·0
3·15
2·2
5·6
3·5
2·0
4·0
1·1
4·5
1·8
1·25
1·4
1·6
NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART



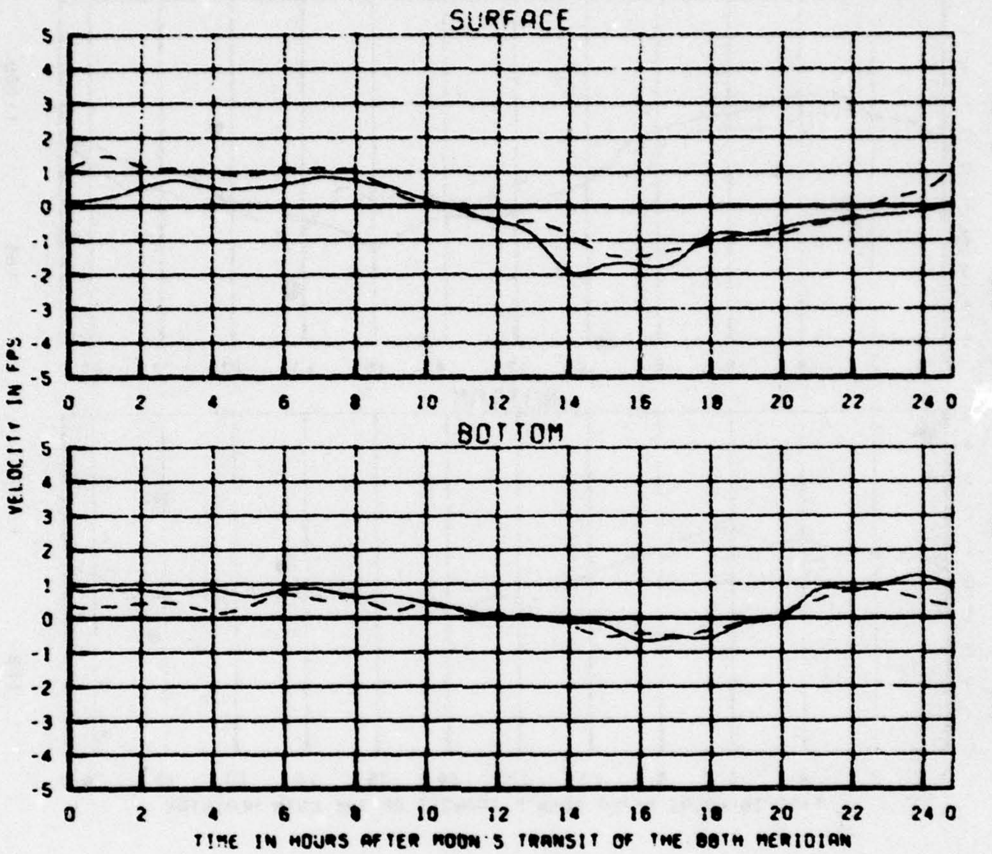

| TEST CONDITIONS | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND
BASE ———
PLAN 2 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 2 ON VELOCITIES

STATION 2



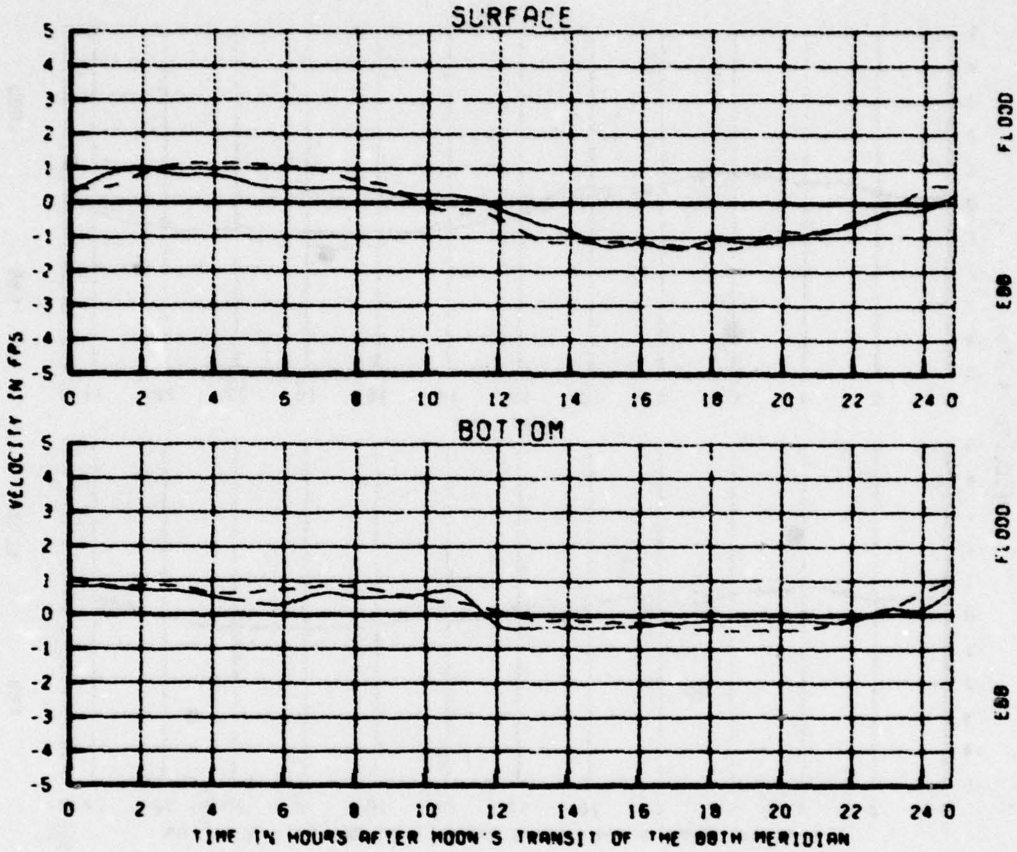

| TEST CONDITIONS | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND
BASE ———
PLAN 2 — — —

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 2 ON VELOCITIES

STATION
3




TEST CONDITIONS

| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

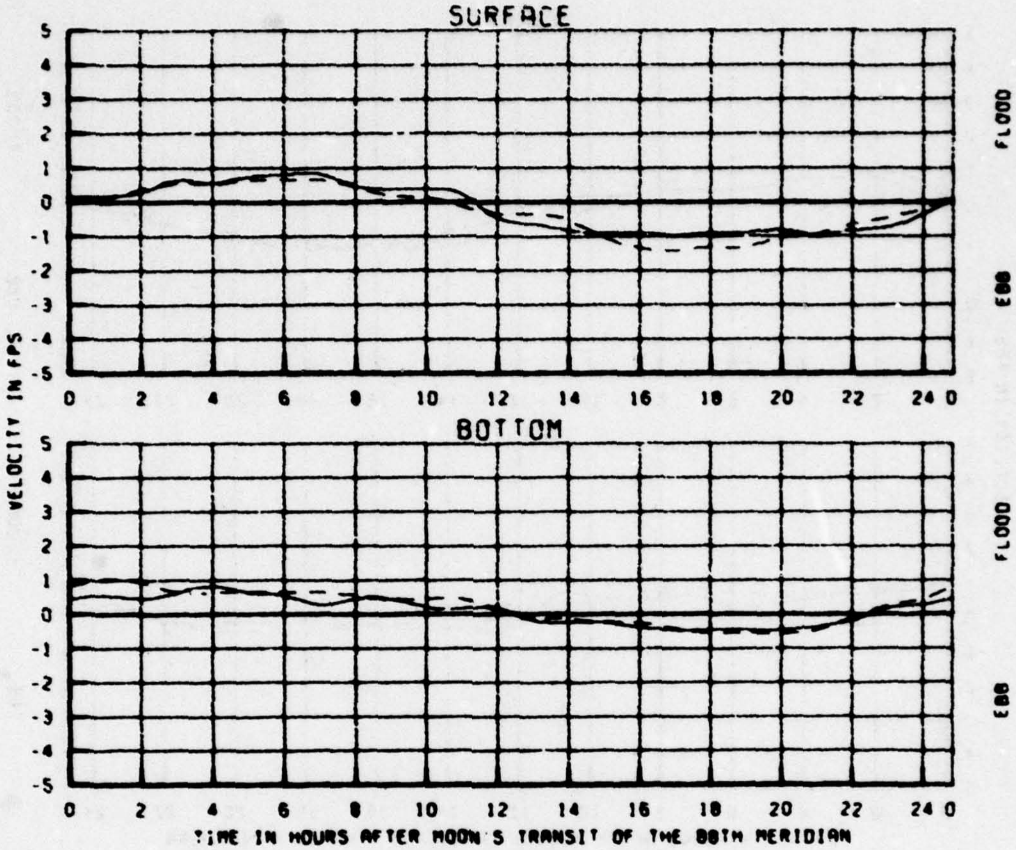
LEGEND
BASE ———
PLAN 2 - - -

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 2 ON VELOCITIES

STATION 4

PLATE 77




TEST CONDITIONS

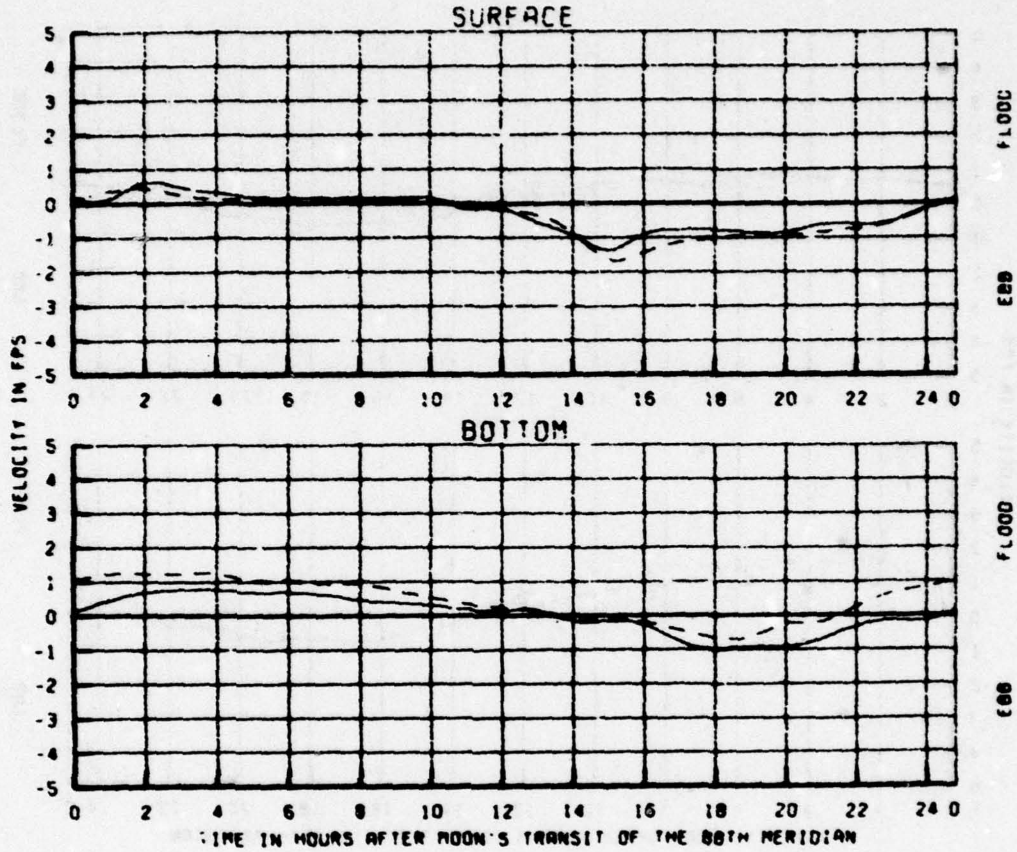
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND
BASE ————
PLAN 2 — — —

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLAN 2 ON
VELOCITIES

STATION
5




TEST CONDITIONS

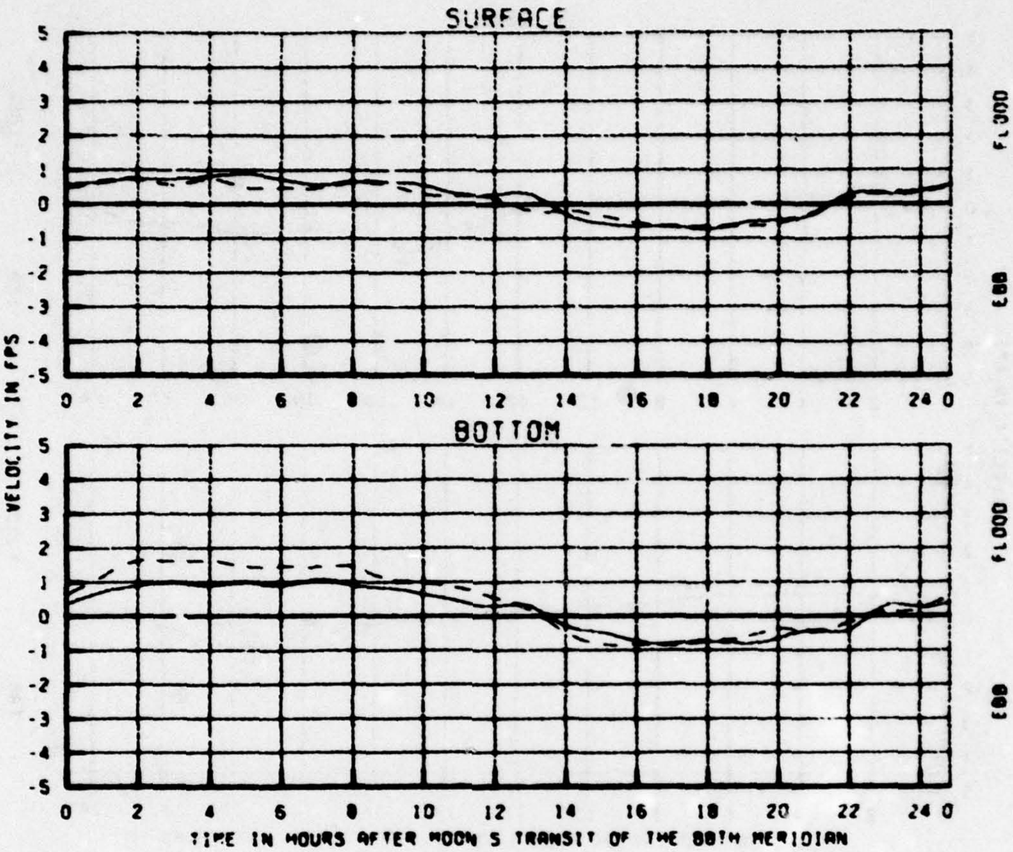
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND
BASE ———
PLAN 2 — — —

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 2 ON VELOCITIES

STATION
6




TEST CONDITIONS

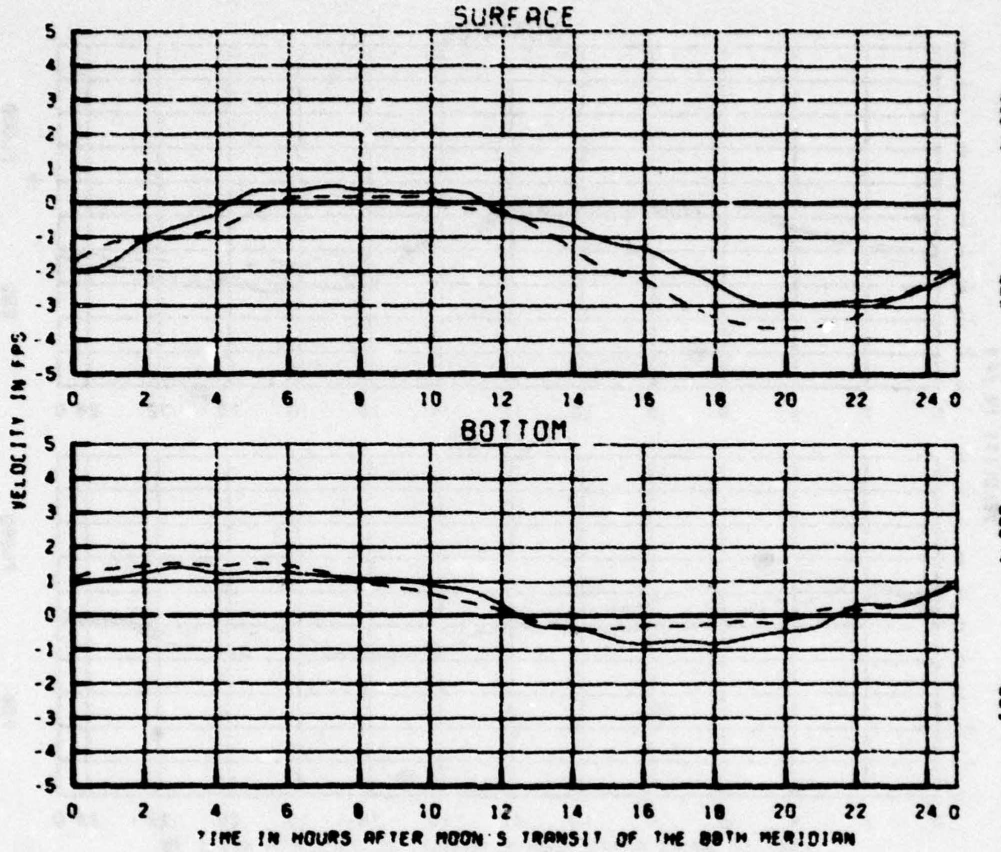
| | | |
|---|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 33274 | CFS |
| TENSAW RIVER INFLOW | 30226 | CFS |

LEGEND
BASE ———
PLAN 2 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 2 ON VELOCITIES

STATION 7




TEST CONDITIONS

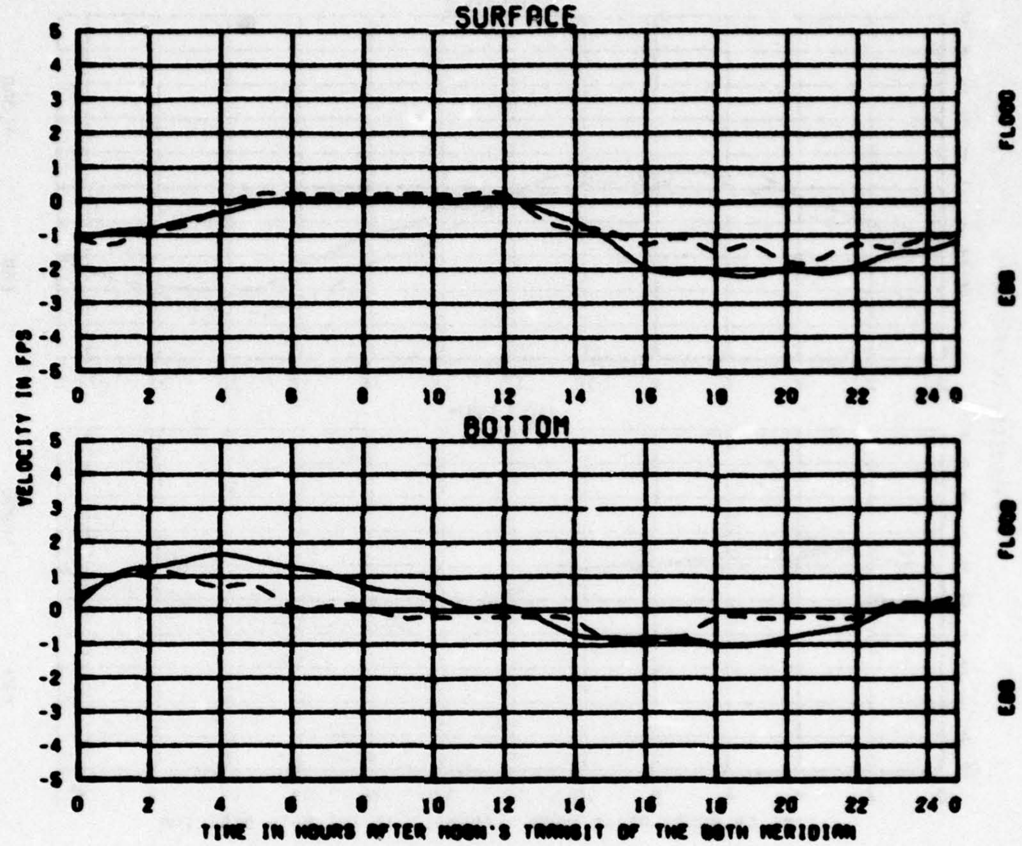
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND
BASE ————
PLAN 2 — — —

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLAN 2 ON
VELOCITIES

STATION
8




TEST CONDITIONS

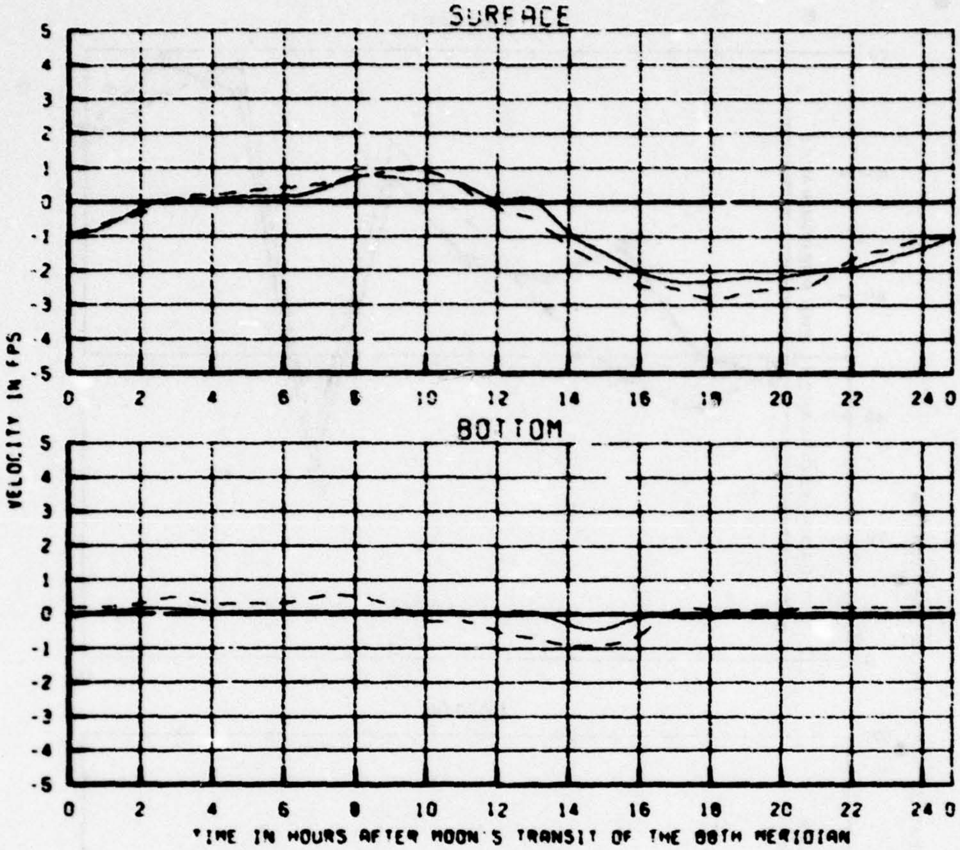
| | |
|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND
BASE ———
PLAN 2 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF
PLAN 2 ON
VELOCITIES

STATION
9




TEST CONDITIONS

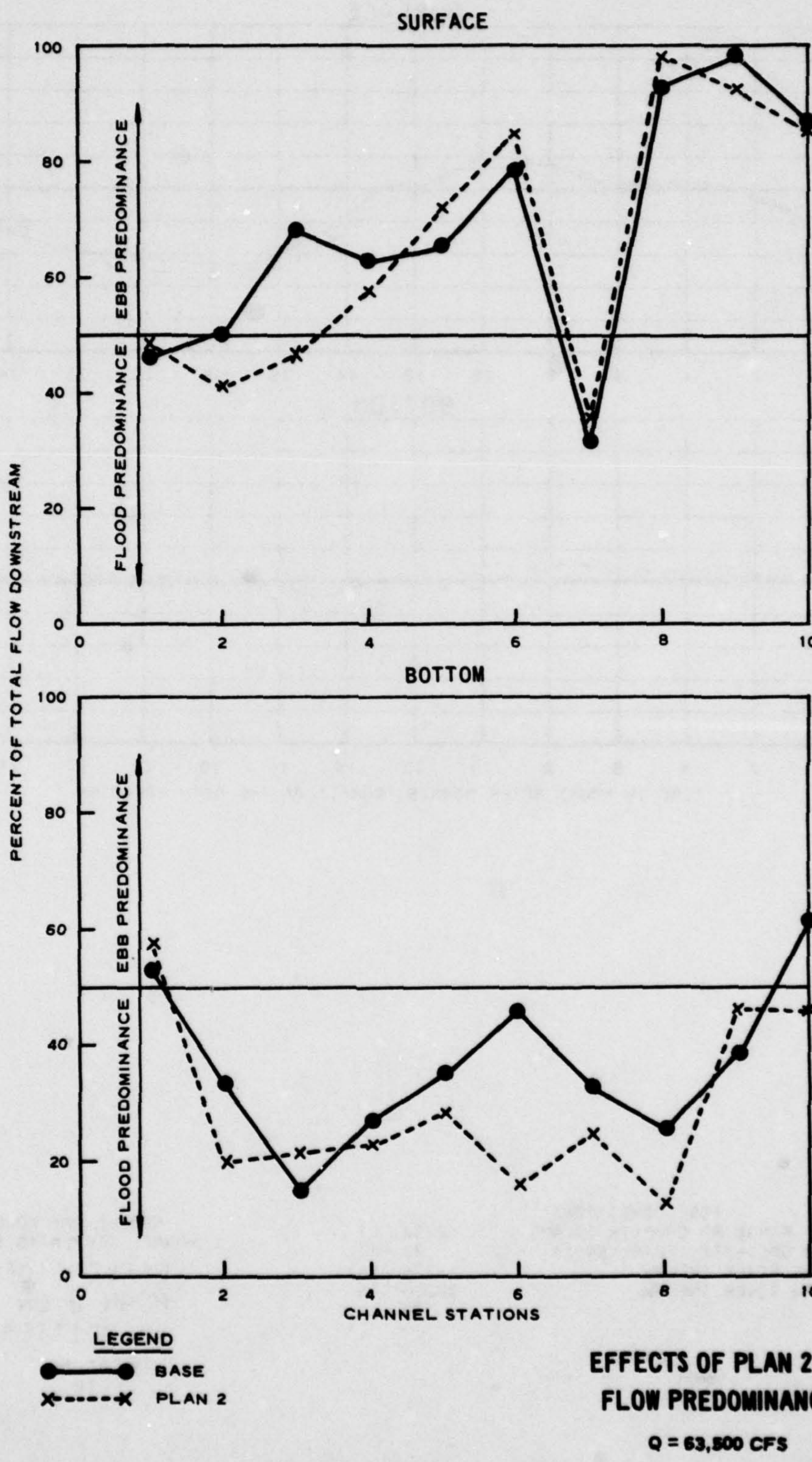
| | | |
|---|---|---|
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 33274 | CFS |
| TENSAW RIVER INFLOW | 30226 | CFS |

LEGEND
BASE ———
PLAN 2 – – –

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

EFFECTS OF PLAN 2 ON VELOCITIES

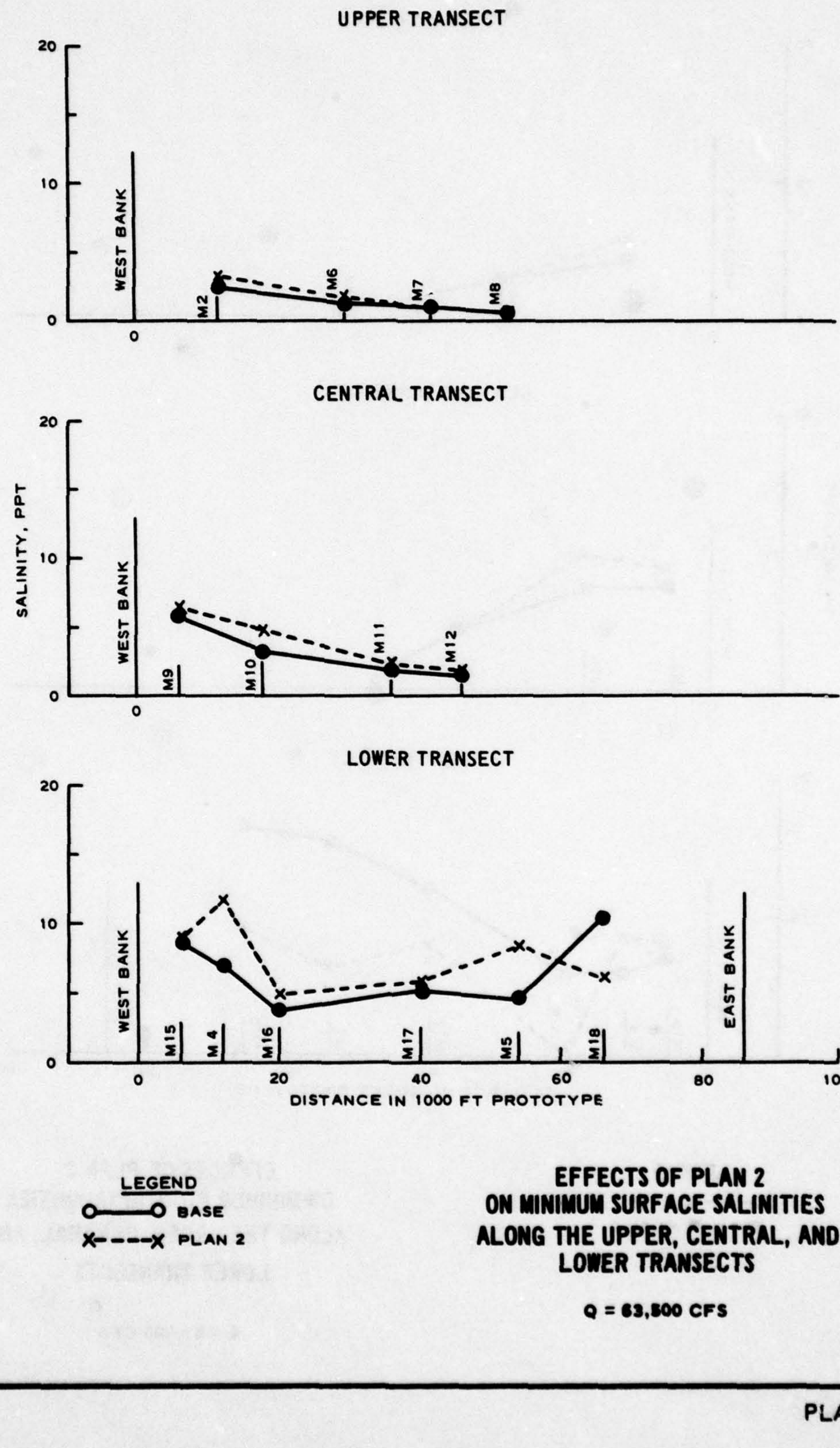
STATION 10




**EFFECTS OF PLAN 2 ON FLOW PREDOMINANCE**

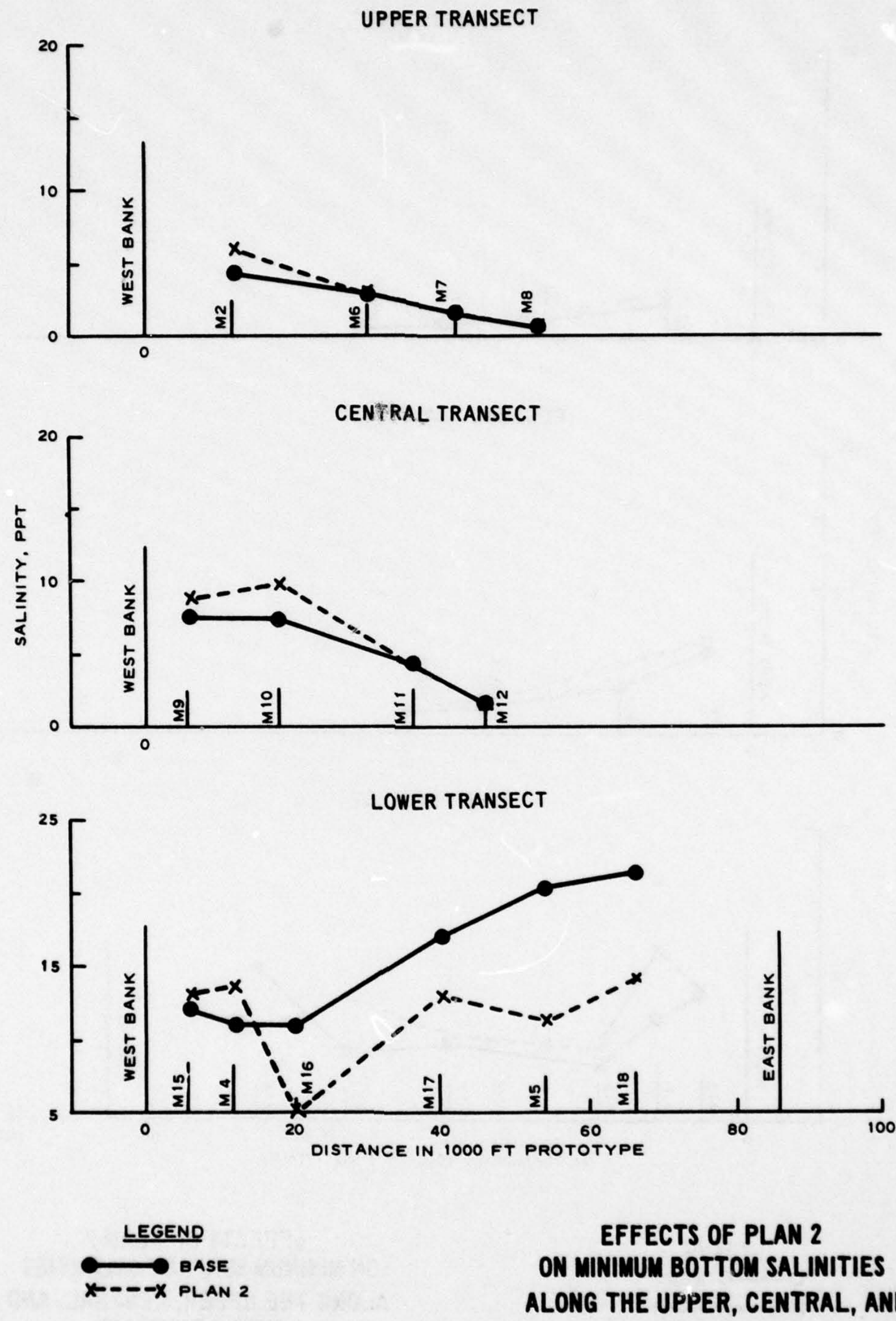
Q = 63,500 CFS

PLATE 84



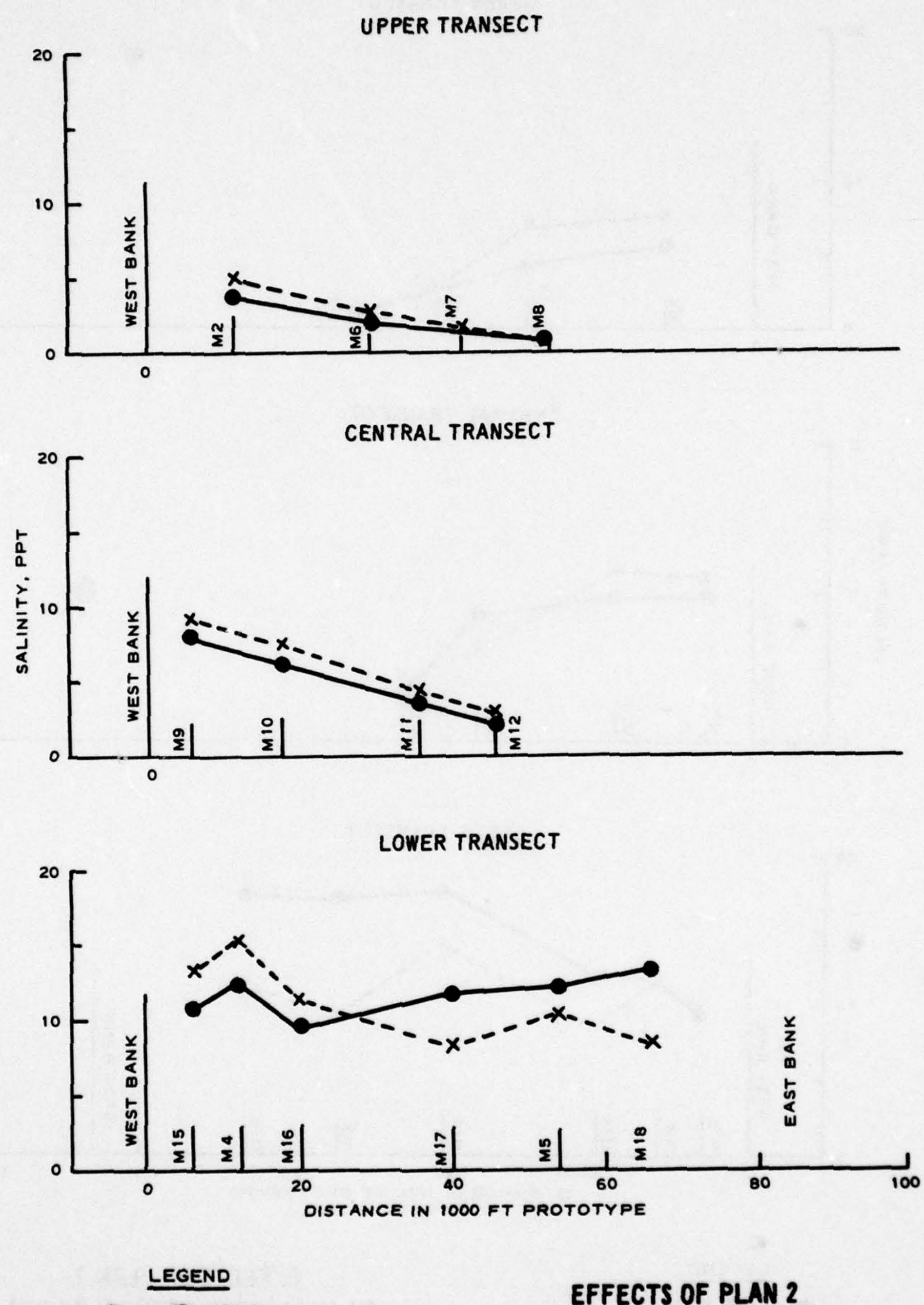

**EFFECTS OF PLAN 2 ON MINIMUM SURFACE SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 63,500 CFS



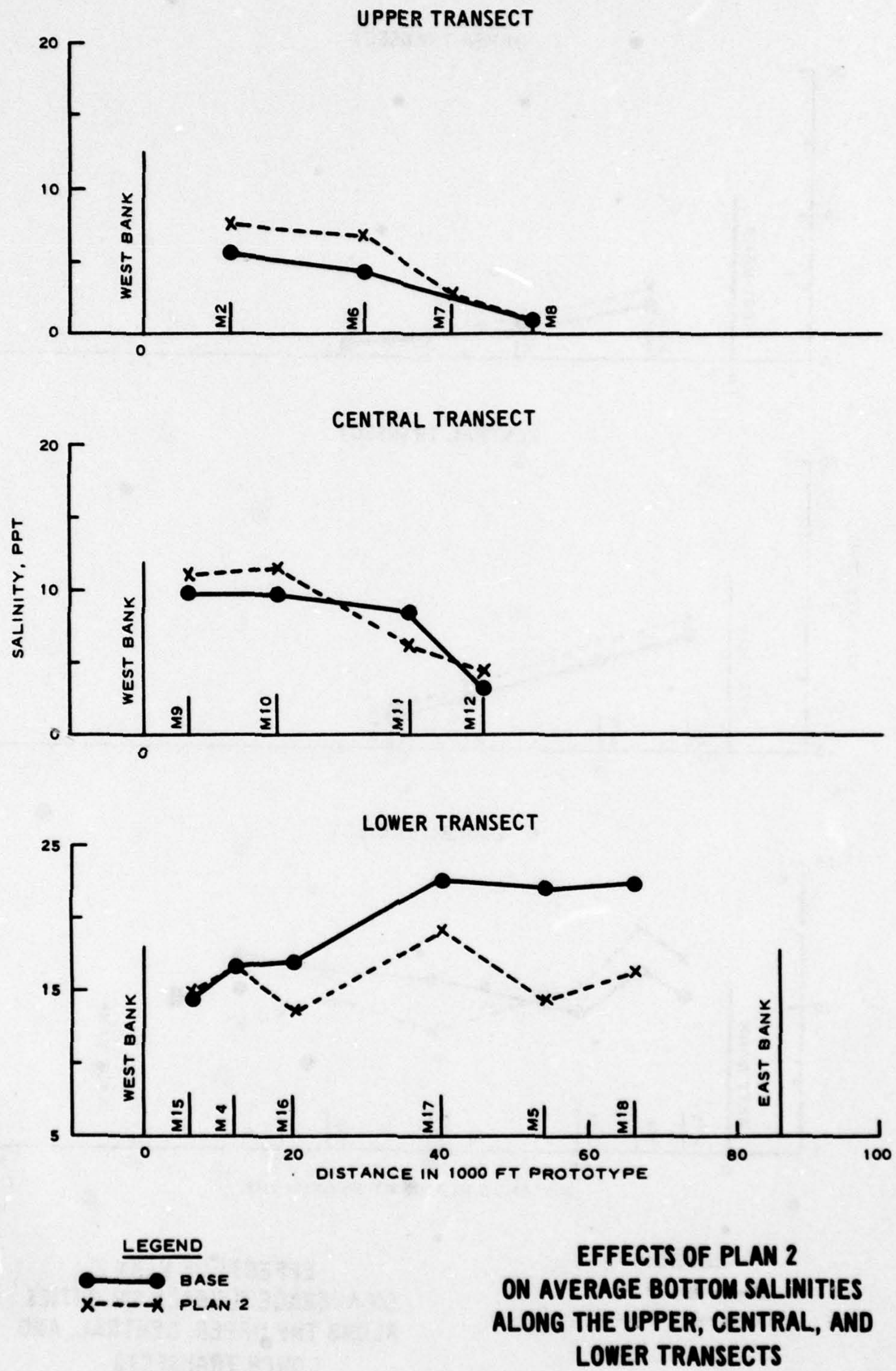

EFFECTS OF PLAN 2
ON MINIMUM BOTTOM SALINITIES
ALONG THE UPPER, CENTRAL, AND
LOWER TRANSECTS

Q = 63,500 CFS



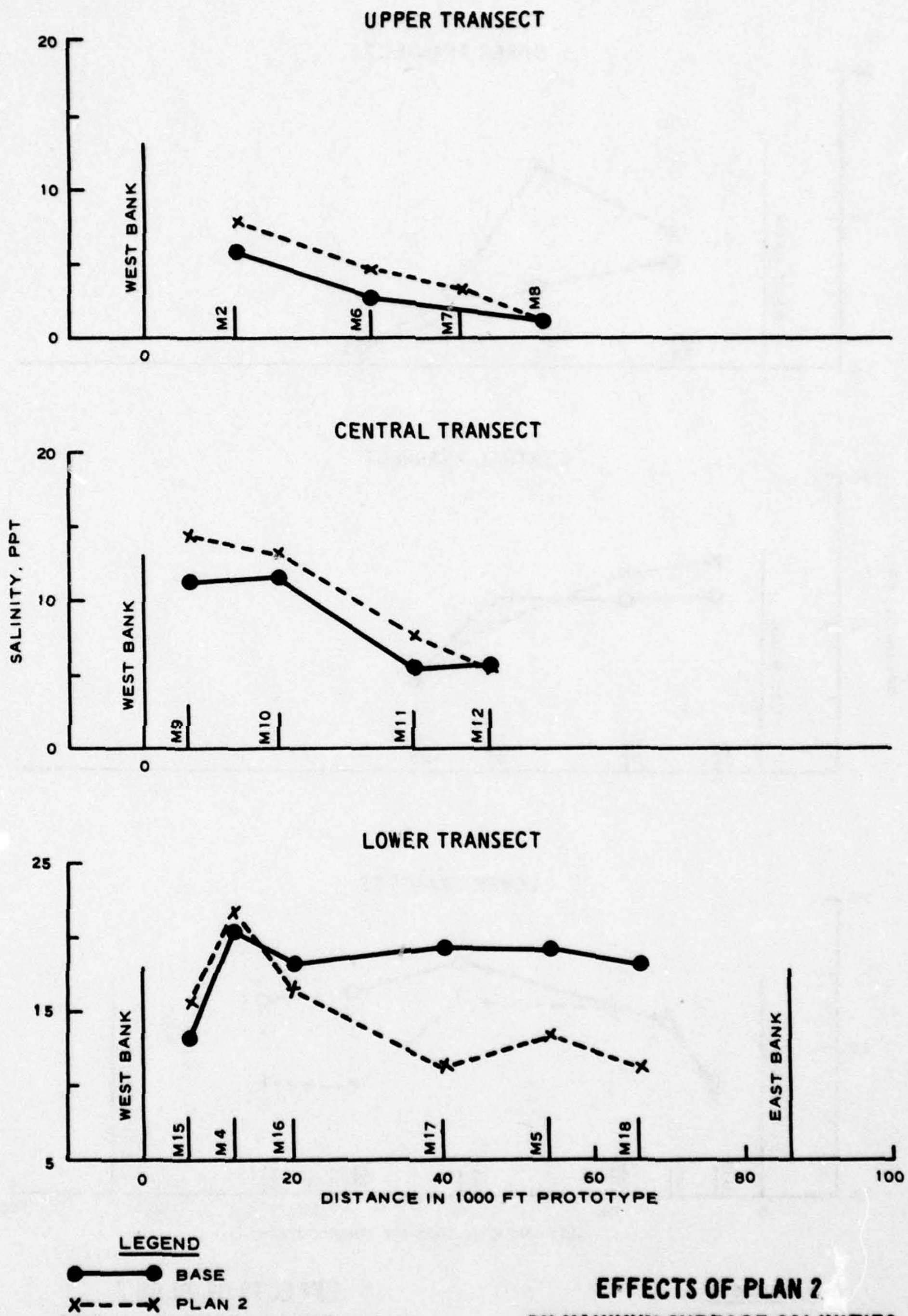

**EFFECTS OF PLAN 2**
**ON AVERAGE SURFACE SALINITIES**
**ALONG THE UPPER, CENTRAL, AND**
**LOWER TRANSECTS**

Q = 63,500 CFS




**EFFECTS OF PLAN 2
ON AVERAGE BOTTOM SALINITIES
ALONG THE UPPER, CENTRAL, AND
LOWER TRANSECTS**

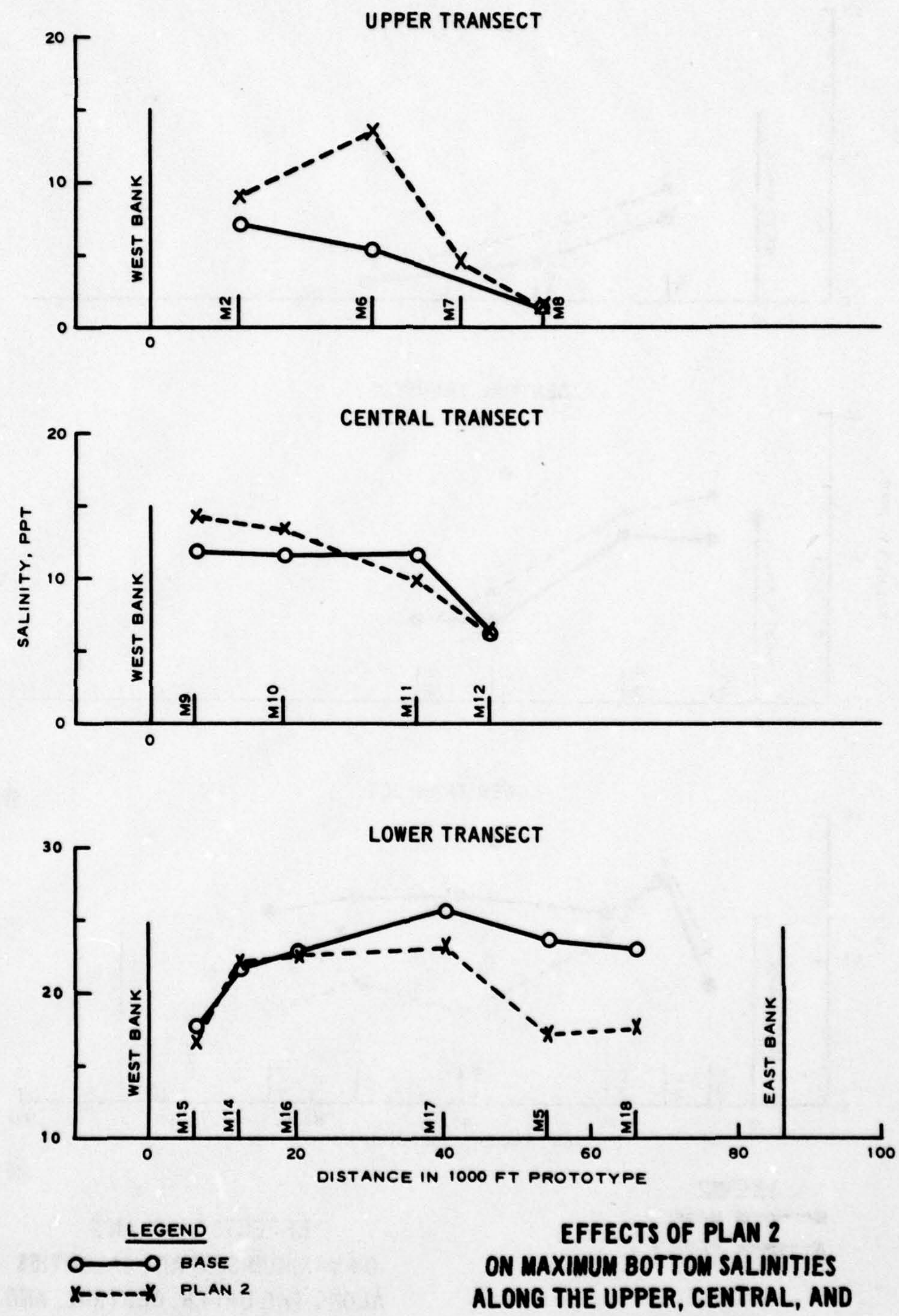
Q = 63,500 CFS




**EFFECTS OF PLAN 2 ON MAXIMUM SURFACE SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 63,500 CFS

PLATE 89




**EFFECTS OF PLAN 2 ON MAXIMUM BOTTOM SALINITIES ALONG THE UPPER, CENTRAL, AND LOWER TRANSECTS**

Q = 63,500 CFS

## APPENDIX A: DYE TIME-CONCENTRATION CURVES FOR PLAN 2

### Introduction

1. A series of dye-dispersion tests were conducted in the model to determine the effects of Plan 2, as shown in Plate A1, on dispersion of conservative dye from the mouth of the Mobile River (injection at location R-1 at bottom depth). The dye release point is shown in Plate A2.

2. The dye used in the model tests was conservative and did not decay with time; thus, applicable decay rates for the prototype effluents involved can be applied directly to the model test data as a basis for predicting prototype conditions as a function of time (with respect to starting the dye release) and distance from the outfalls in the model tests. The analysis of the data for various decay rates is not addressed in this appendix.

### Tests and Results

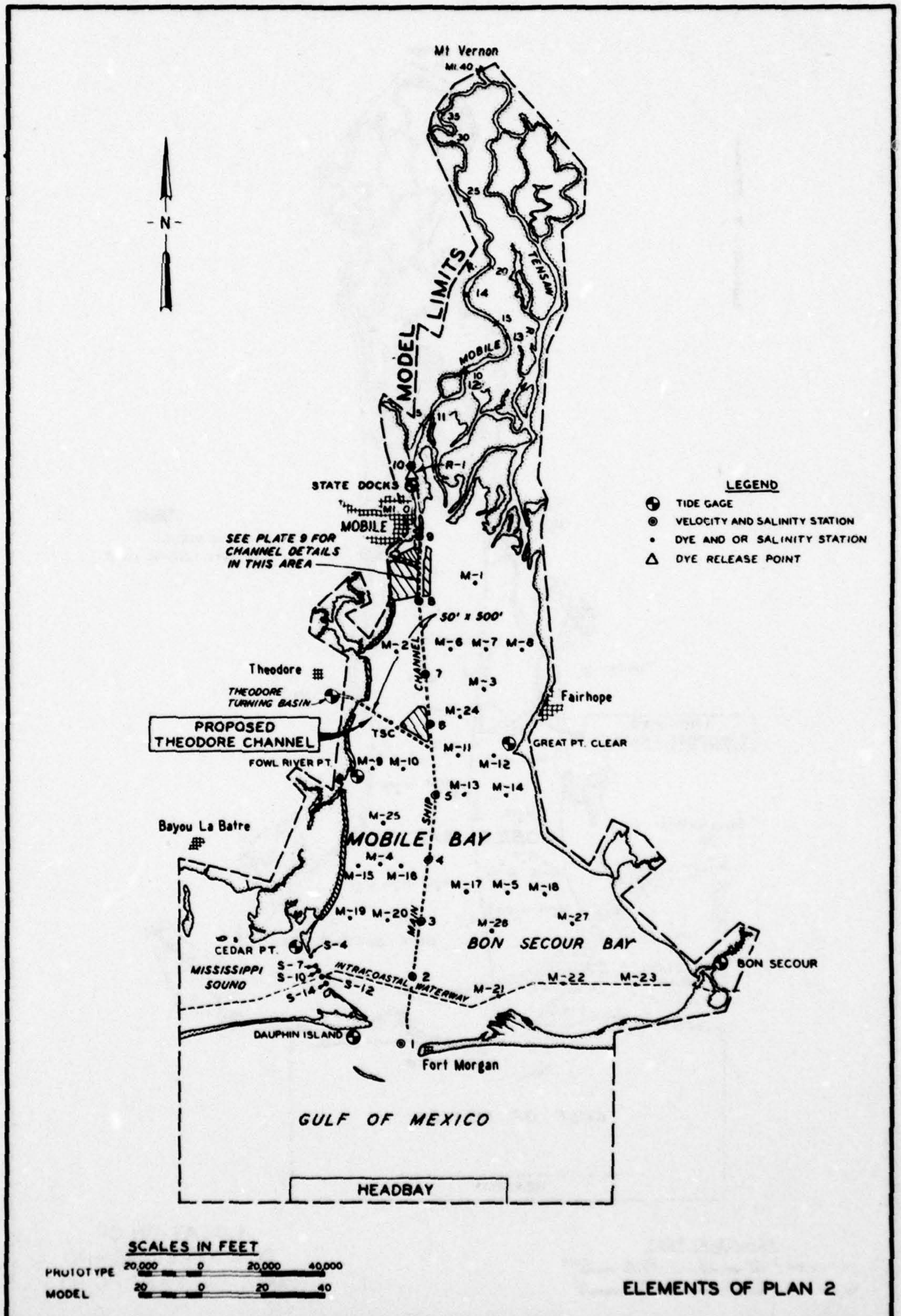
3. Two conditions were subjected to the dye-dispersion tests: base tests, or tests of existing conditions, and tests of Plan 2. Both base and plan tests included the access channel to the Theodore Industrial area plus a dredged material disposal area, as shown in Plates 1 (main text) and A1. The results of the base tests are not shown seprately but are included with similar data for the plan tests for ease of comparison.

4. For all the dye-dispersion tests, the model was operated for conditions of a Gulf tidal range of 2.3 ft, lower low water to higher high water, measured at the Dauphin Island Gulf gage; a total freshwater inflow at Mt. Vernon of 62,500 cfs (Mobile River, 33,274 cfs; Tensaw River, 30,226 cfs); and a constant source salinity of 30 ppt in the Gulf and Mississippi Sound supply sumps.

5. The testing procedures for the dye-dispersion tests were the same as for the previously described hydraulic and salinity tests in the basic report, and dye injection was not initiated until conditions in

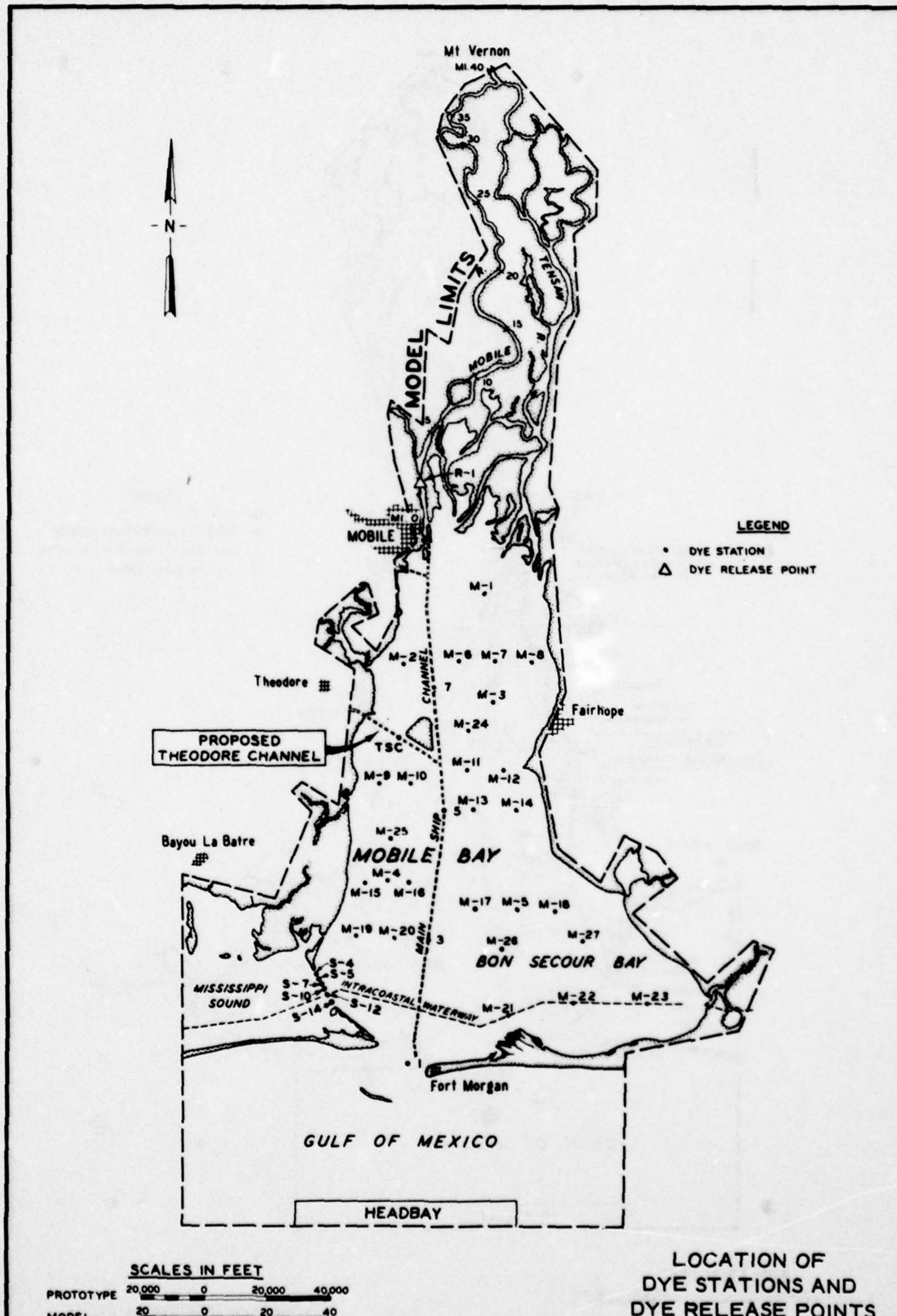
the bay had reached salinity stability. The fluorescent dye, Pontacyl Brilliant Pink, was used for all model tests. At the time of local high-water slack prior to releasing the dye for the base test (local high-water slack and local low-water slack for the Plan 2 test), samples were obtained at both surface and bottom depths at each sampling station to determine the concentration of dye or "background" concentrations, remaining from previous tests. Subsequently, samples obtained from each station were adjusted to remove respective background concentrations. If background concentrations in excess of 50 parts per billion (ppb) were found, all source water was discarded, and the model and sumps were washed prior to renewal of the Gulf supply. Prior to injection, 40 g of dye were mixed with fresh water to make 40 liters of solution. Injection of the dye-water mixture was started after salinity stability was achieved and continued at a uniform rate of 35 cc/min for 50 tidal cycles.

6. For the base test, water samples from the surface and bottom depths were obtained at each local high-water slack at sta 1, 3, 5, 7, S-4, S-5, S-7, S-10, S-12, S-14, and M-1 through M-23 (as shown in Plate A2). The base test data used in this study were obtained during the study of the proposed Theodore Ship Channel (Report 1). Only high-water slack samples were obtained for the base test. For the Plan 2 test, water samples from the surface and bottom depths were obtained at local high-water slack and local low-water slack at sta 1, 3, 5, 7, S-4, S-5, S-7, S-10, S-12, S-14, M-1 through M-27, and TSC (as shown in Plate A2). The samples were allowed to reach a stable temperature of 74°F and were later analyzed by a fluorometer to determine their respective dye concentrations. Test results are presented in Plates A3-A40.



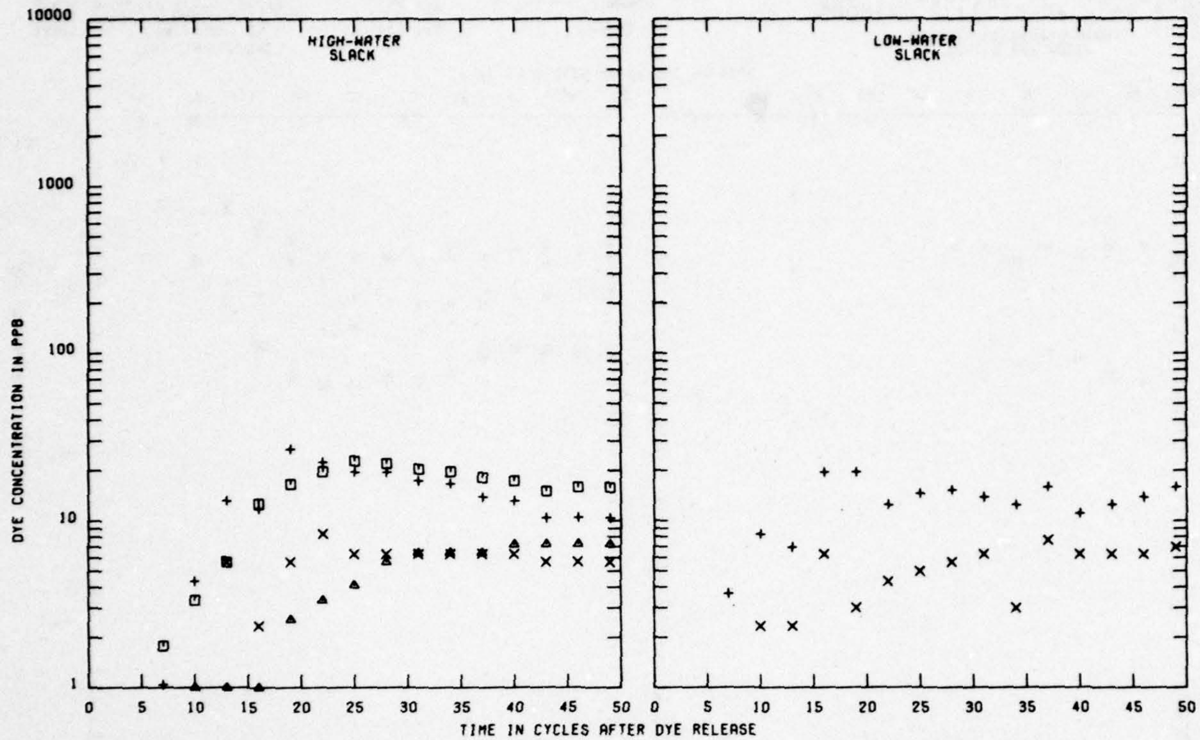
Mt Vernon
N
MODEL LIMITS
TENSAW
MOBILE
STATE DOCKS
MOBILE
SEE PLATE 9 FOR CHANNEL DETAILS IN THIS AREA
LEGEND
TIDE GAGE
VELOCITY AND SALINITY STATION
DYE AND OR SALINITY STATION
DYE RELEASE POINT
50' x 500'
Theodore
THEODORE TURNING BASIN
PROPOSED THEODORE CHANNEL
TSC
MAIN SHIP CHANNEL
Fairhope
GREAT PT. CLEAR
FOWL RIVER PT.
Bayou La Batre
MOBILE BAY
BON SECOUR BAY
CEDAR PT.
MISSISSIPPI SOUND
INTRACOASTAL WATERWAY
BON SECOUR
DAUPHIN ISLAND
Fort Morgan
GULF OF MEXICO
HEADBAY
SCALES IN FEET
PROTOTYPE 20,000 0 20,000 40,000
MODEL 20 0 20 40
ELEMENTS OF PLAN 2


PLATE A1




LOCATION OF
DYE STATIONS AND
DYE RELEASE POINTS

PLATE A2




| TEST CONDITIONS | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—··— | BOTTOM | |

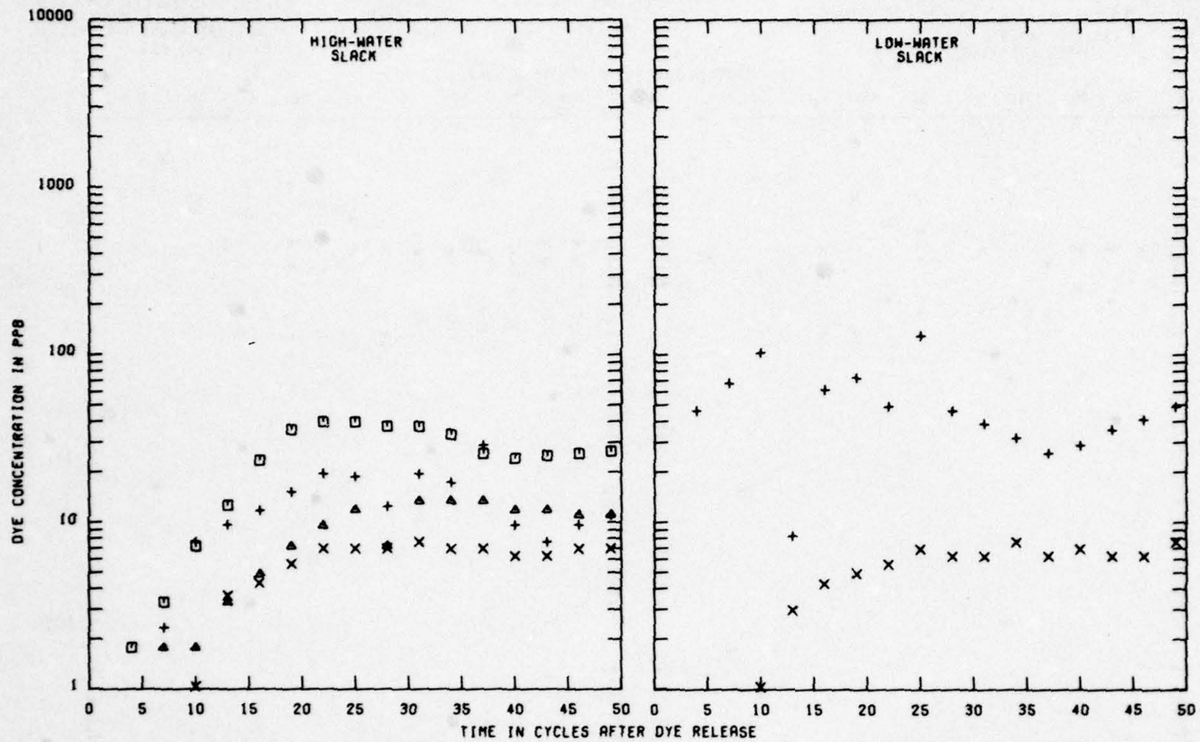
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY

INJECTION AT STATION R1

STATION 1

PLATE A3




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION 3

PLATE A4

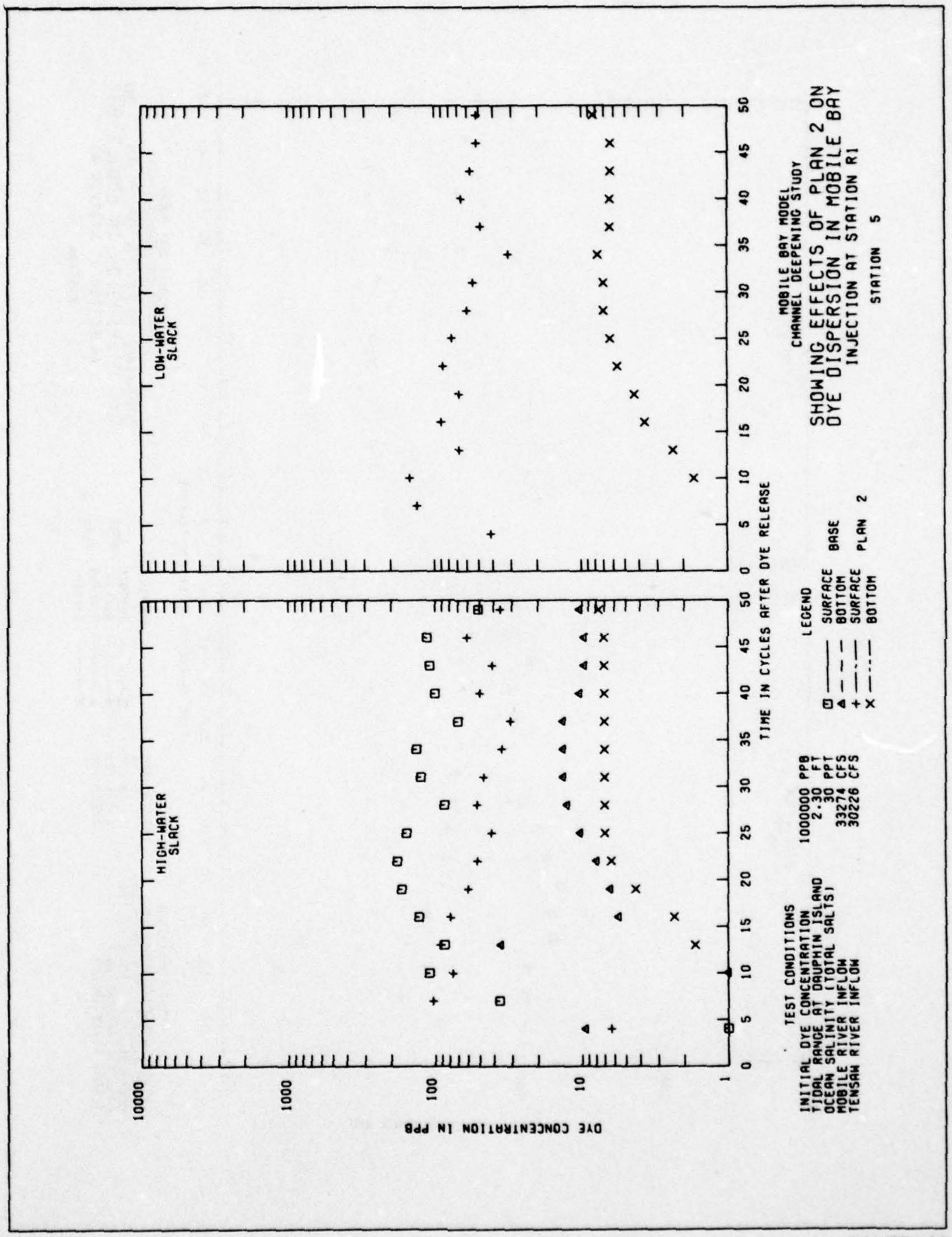
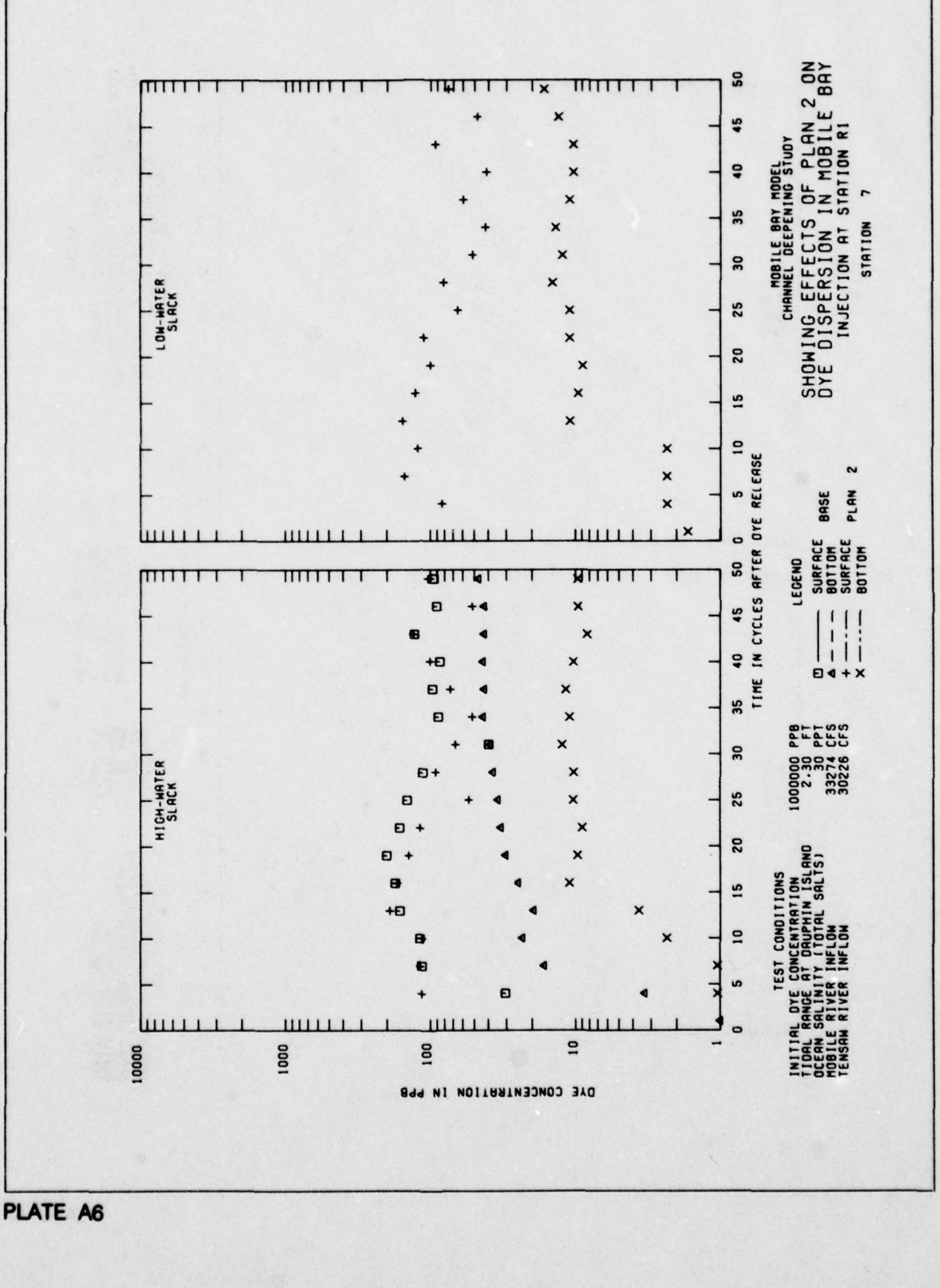

HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
10000
1000
100
10
1
TIME IN CYCLES AFTER DYE RELEASE
0
5
10
15
20
25
30
35
40
45
50
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION 5

PLATE A5



MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION 7
HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
10000
1000
100
10
1
0
5
10
15
20
25
30
35
40
45
50
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2


PLATE A6

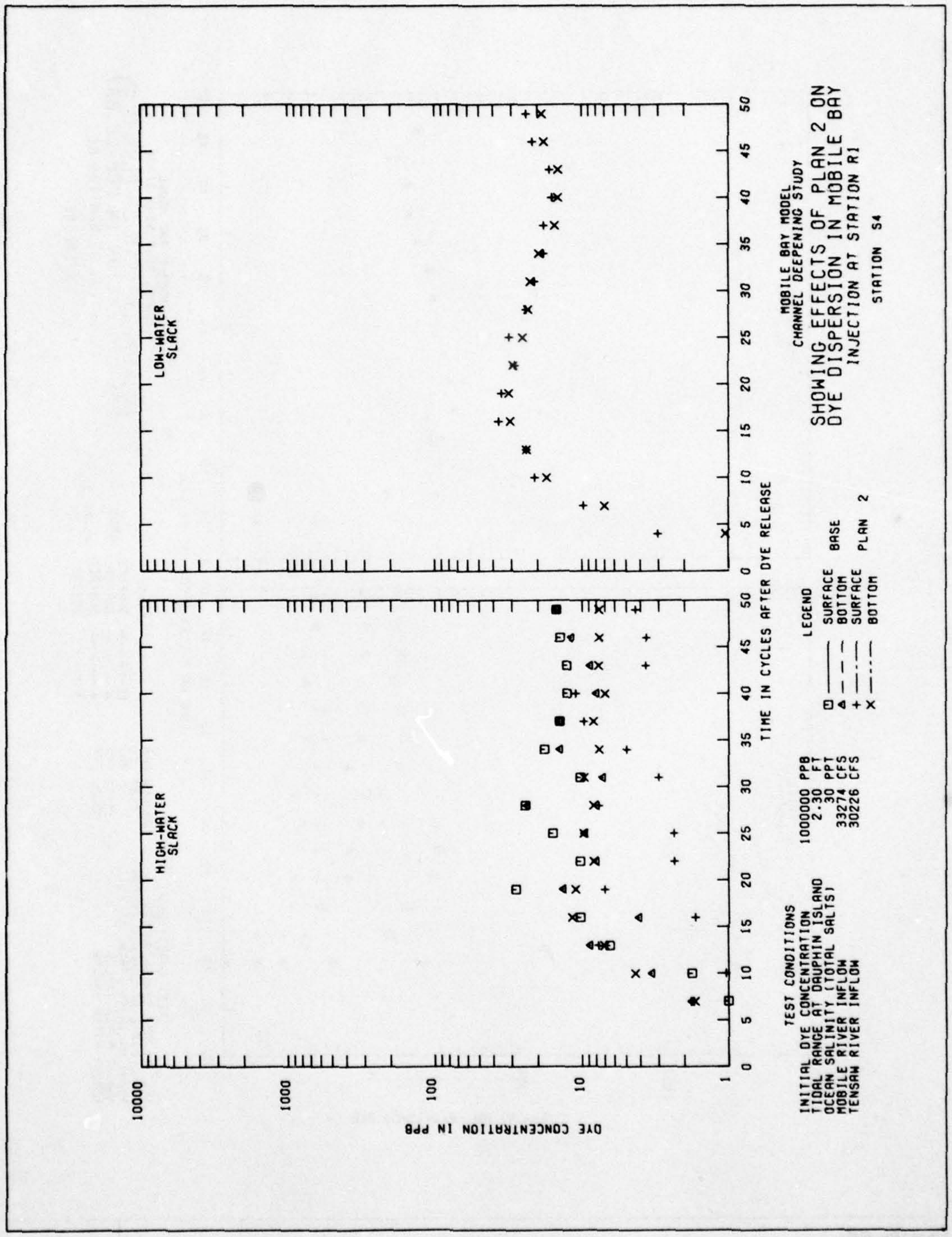

HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
10000
1000
100
10
1
0
5
10
15
20
25
30
35
40
45
50
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE BASE
BOTTOM
SURFACE PLAN 2
BOTTOM
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION S4

PLATE A7

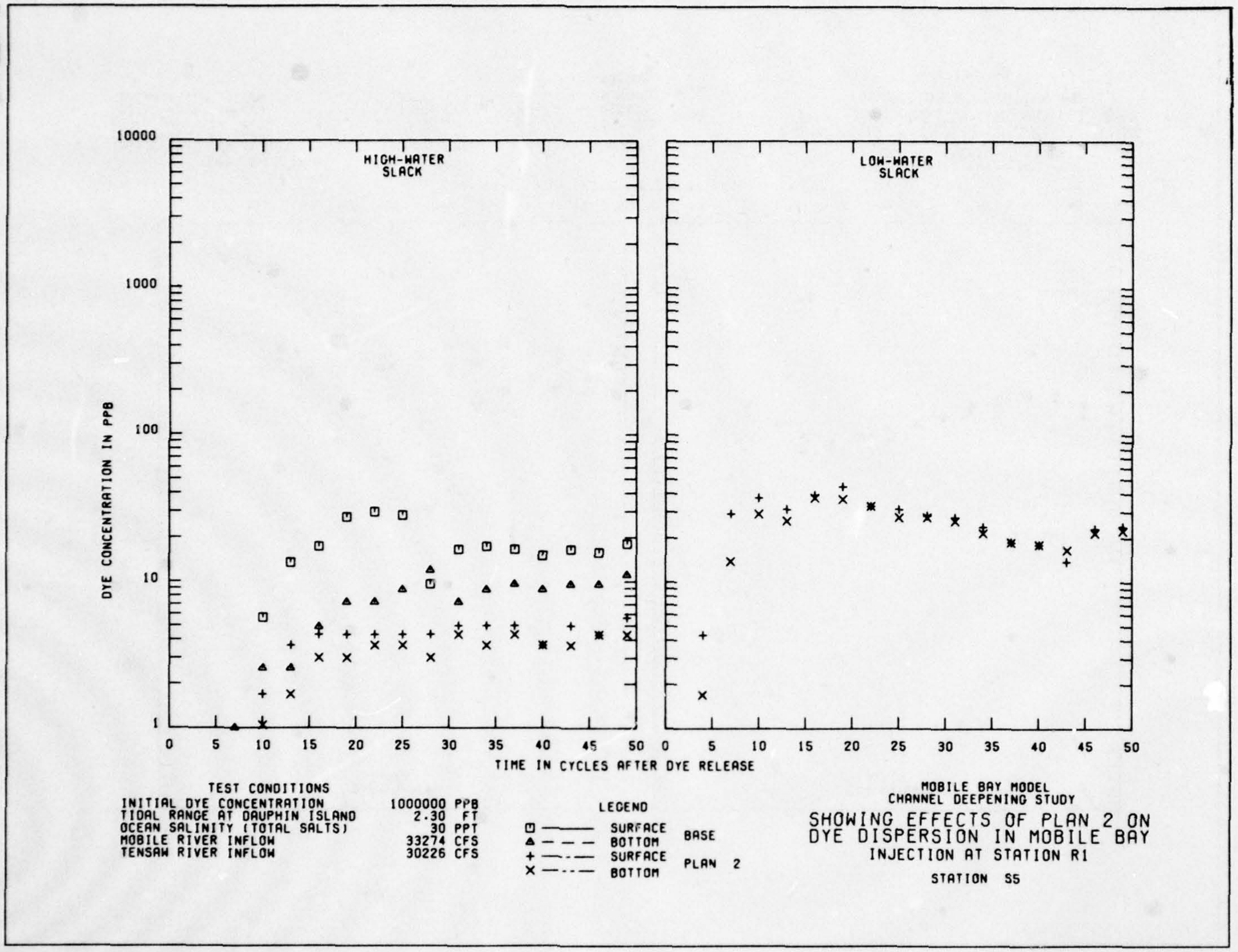
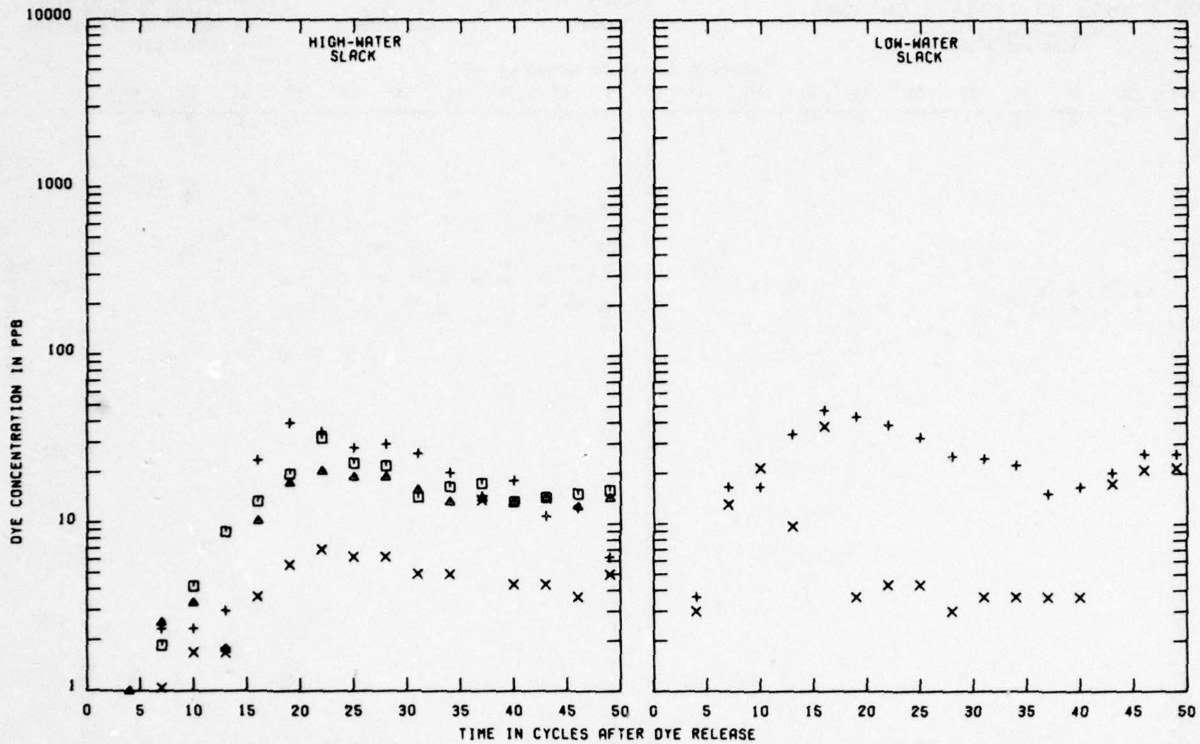

HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
10000
1000
100
10
1
0 5 10 15 20 25 30 35 40 45 50
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION S5

PLATE A8




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION S7

PLATE A9

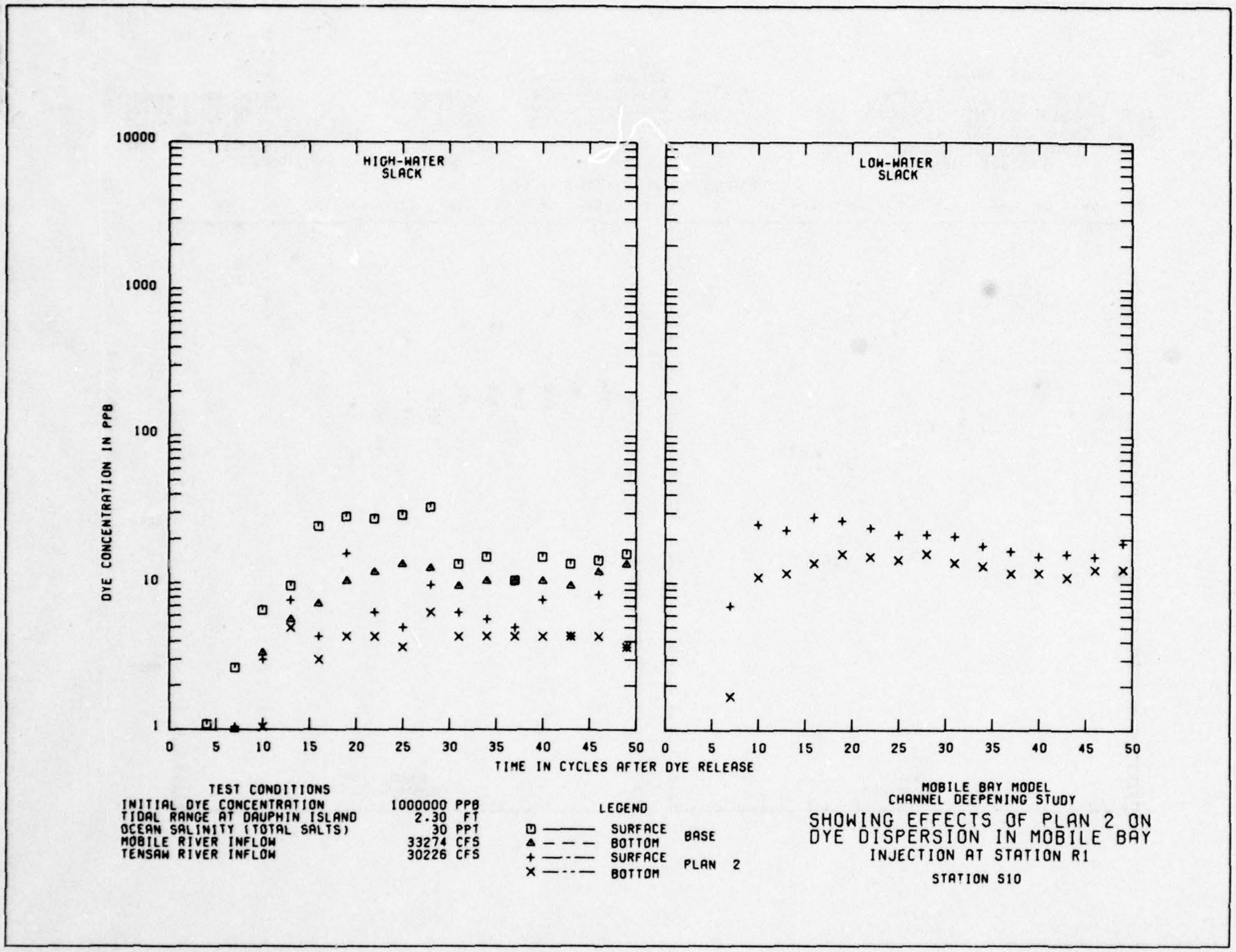
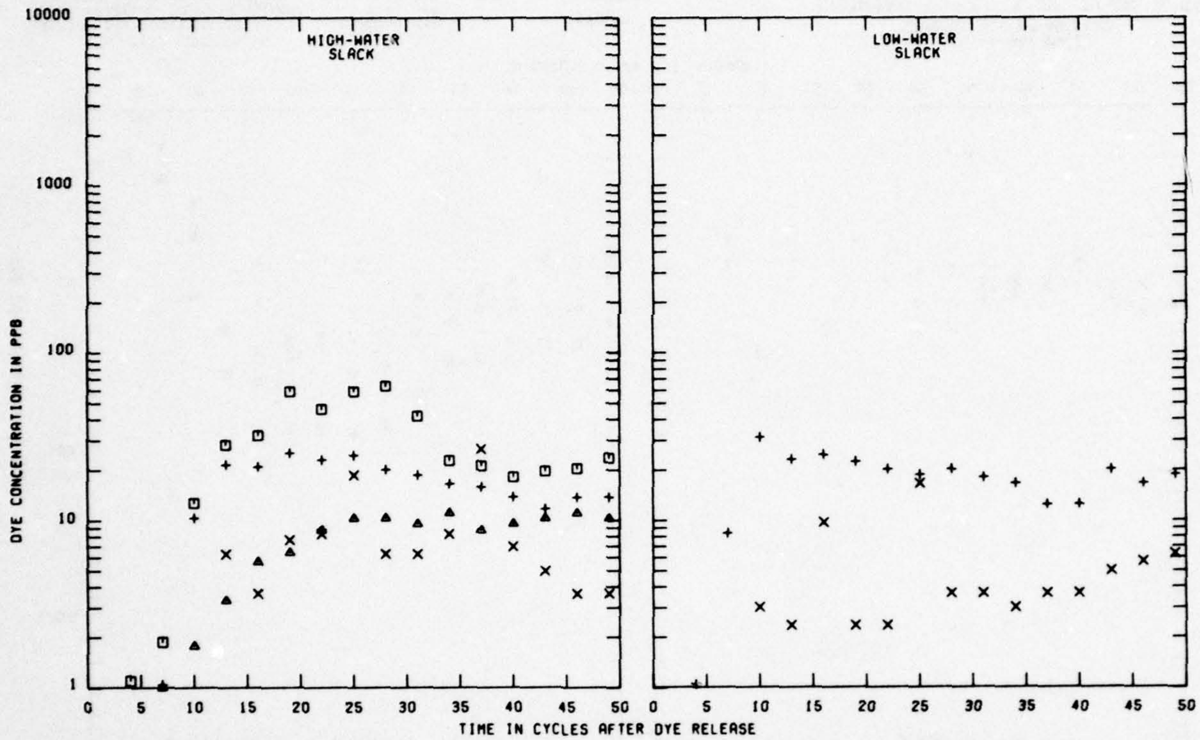

HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
10000
1000
100
10
1
0 5 10 15 20 25 30 35 40 45 50
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION S10

PLATE A10




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

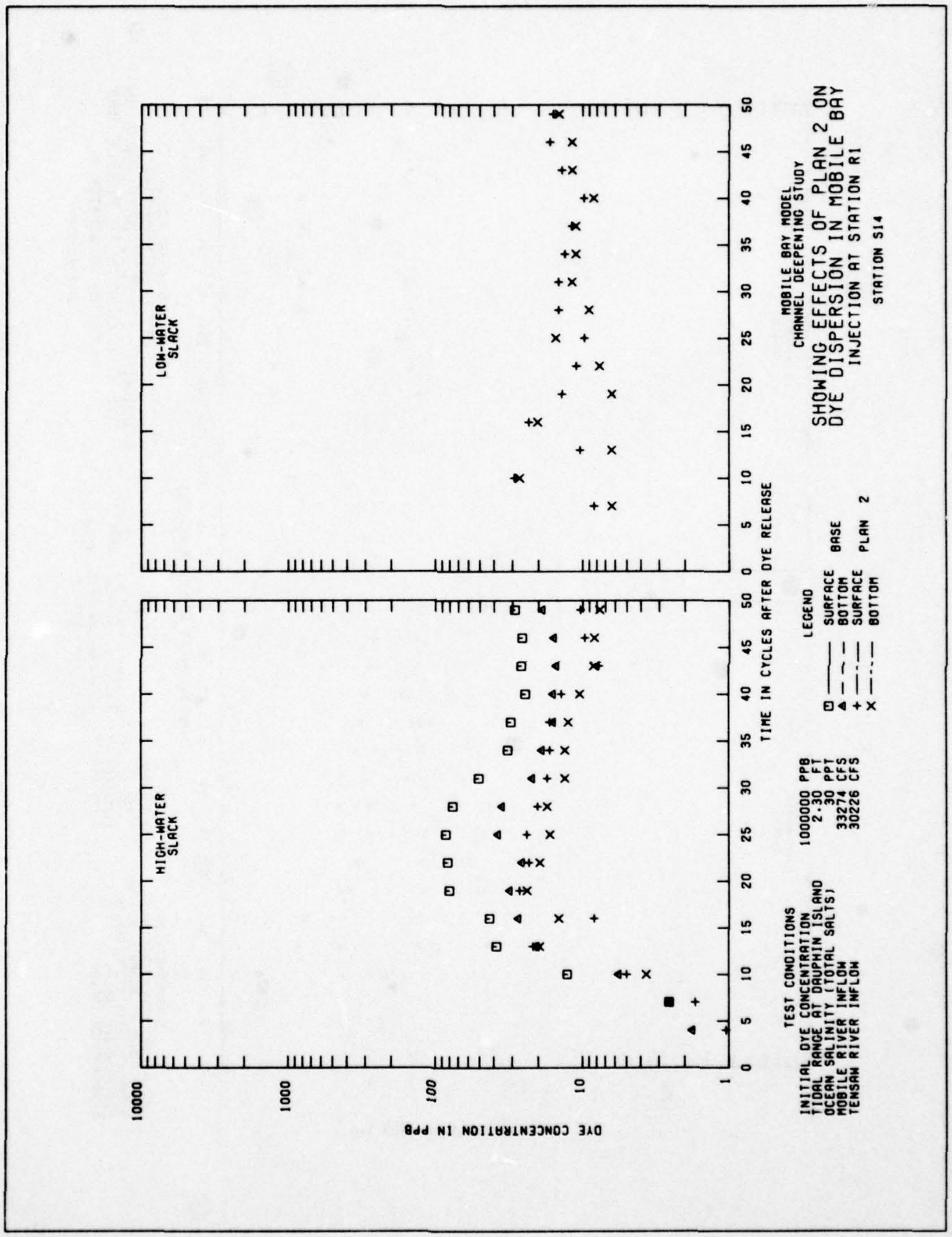
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—·· | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

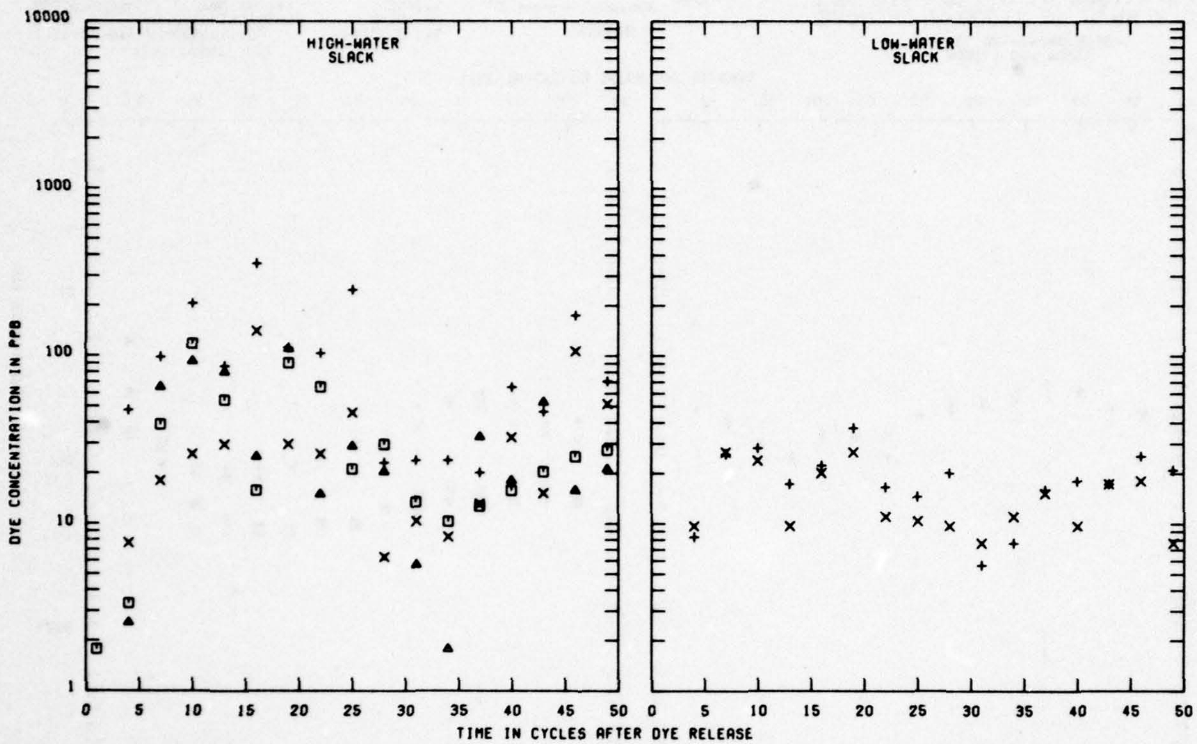
STATION S12

PLATE A11



HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
10000
1000
100
10
1
0 5 10 15 20 25 30 35 40 45 50
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION S14


PLATE A12




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M1

PLATE A13

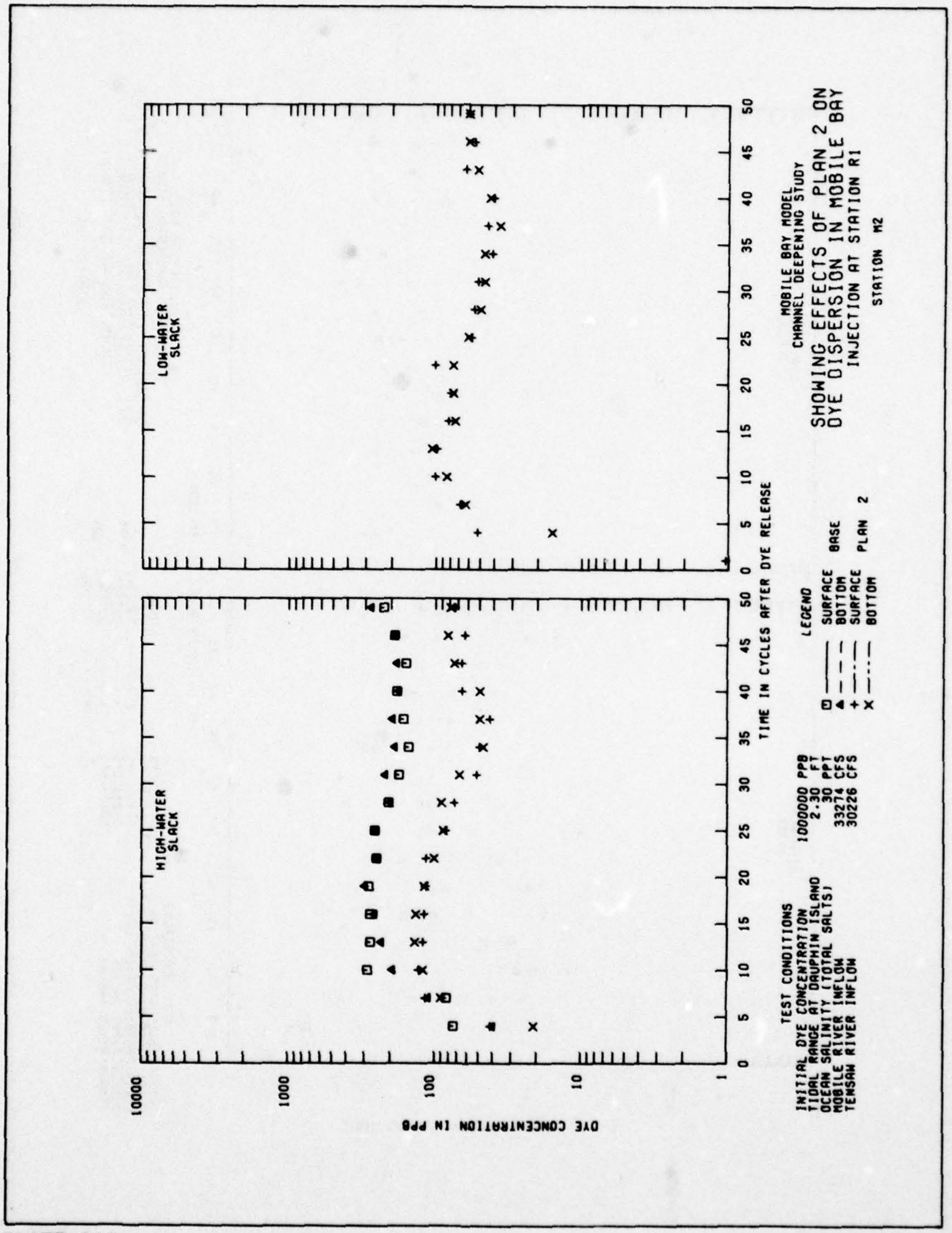

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION M2
HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 36.30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2
10000
1000
100
10
1
0
5
10
15
20
25
30
35
40
45
50

PLATE A14

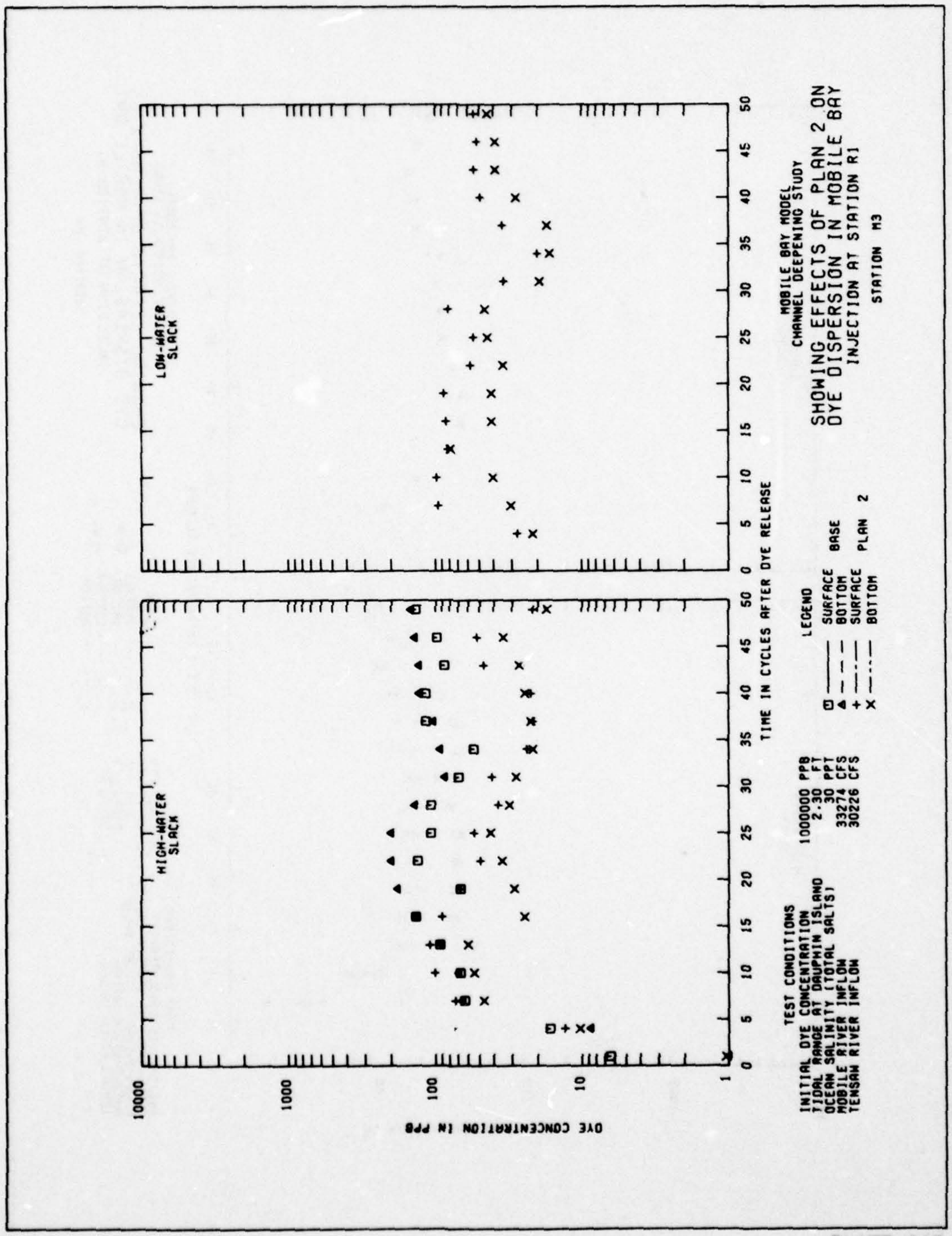

HIGH-WATER
SLACK
LOW-WATER
SLACK
DYE CONCENTRATION IN PPB
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION M3

PLATE A15

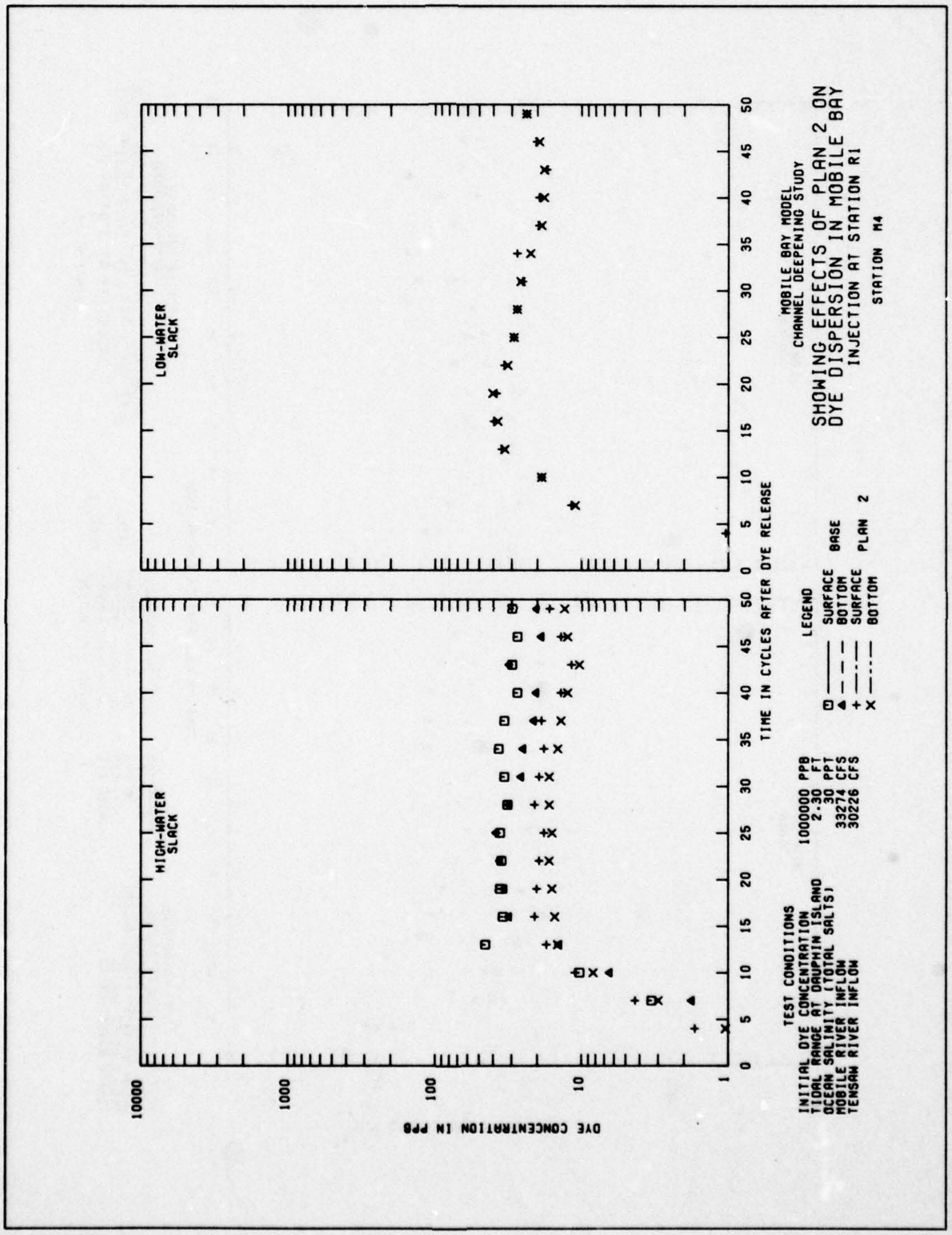
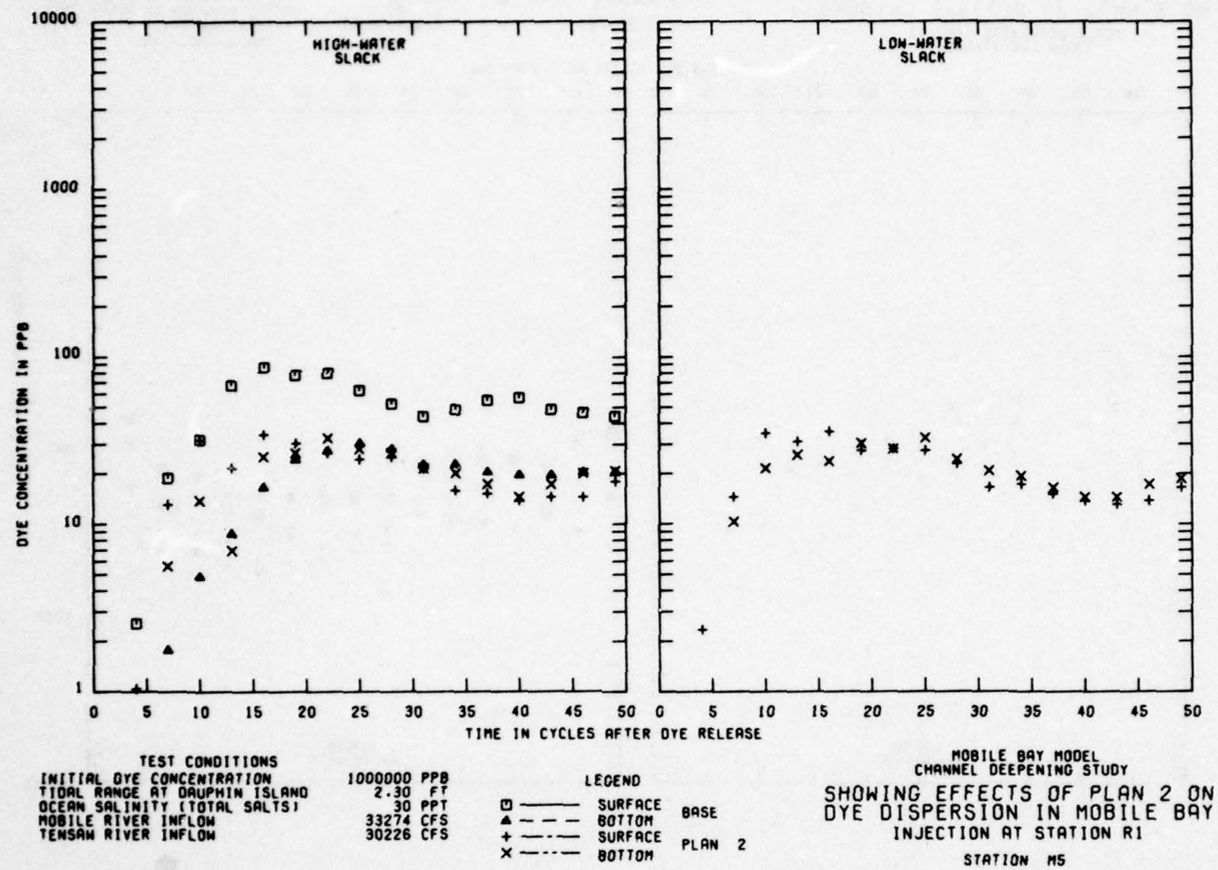

HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
10000
1000
100
10
1
0 5 10 15 20 25 30 35 40 45 50
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION M4

PLATE A16




MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M5

PLATE A17

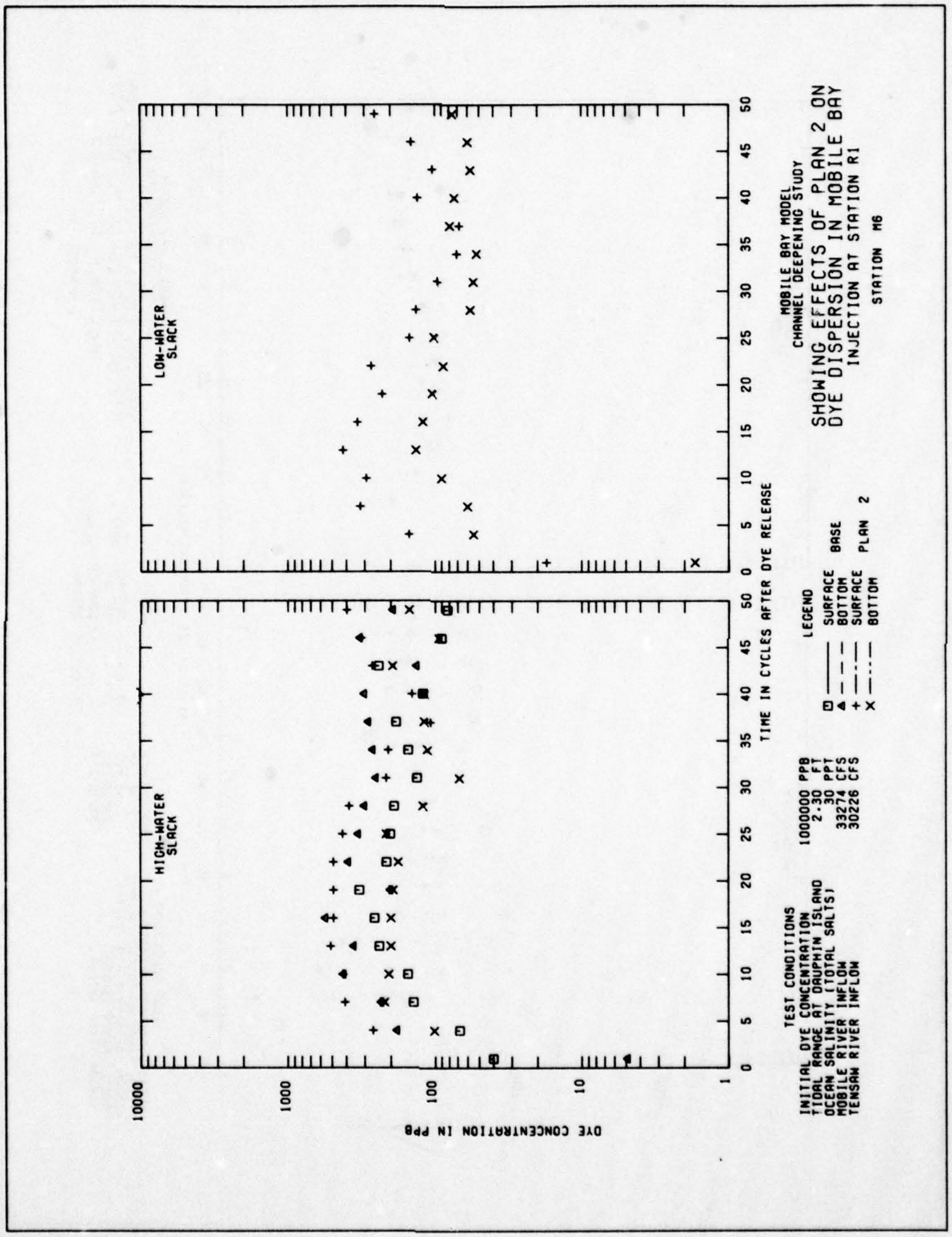
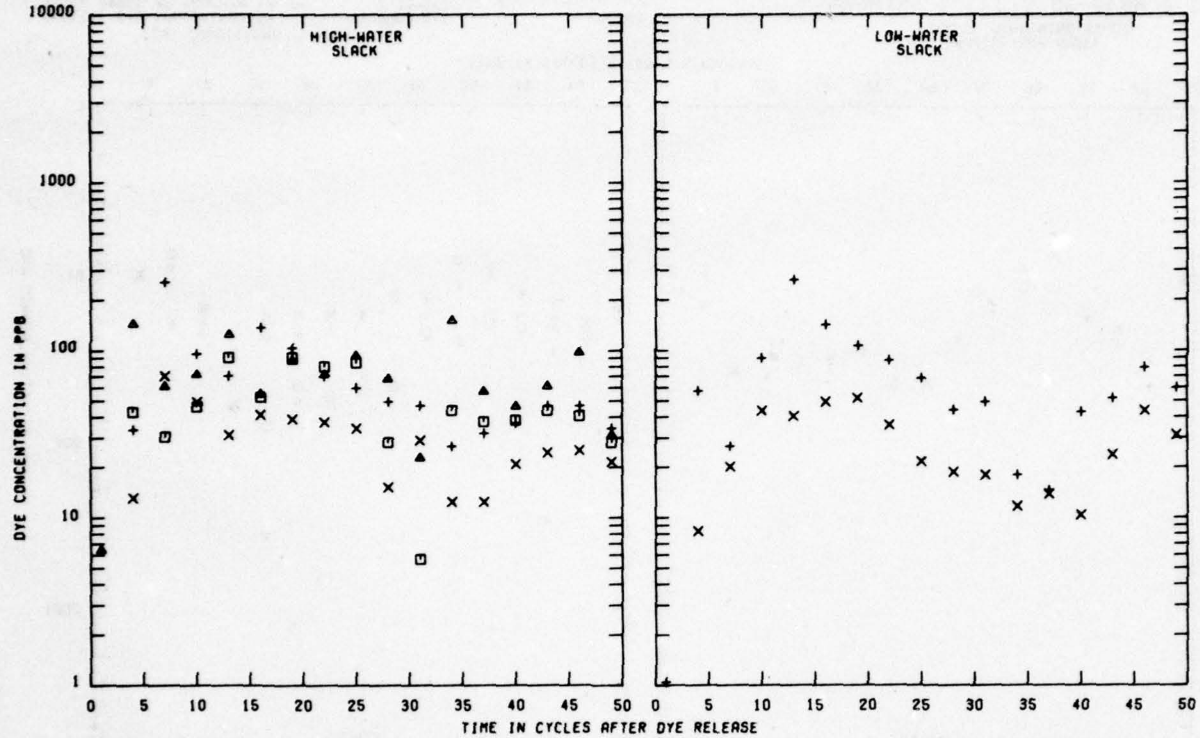

HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
10000
1000
100
10
1
0 5 10 15 20 25 30 35 40 45 50
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE BASE
BOTTOM
SURFACE PLAN 2
BOTTOM
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION M6

PLATE A18




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY

INJECTION AT STATION R1

STATION M7

PLATE A19

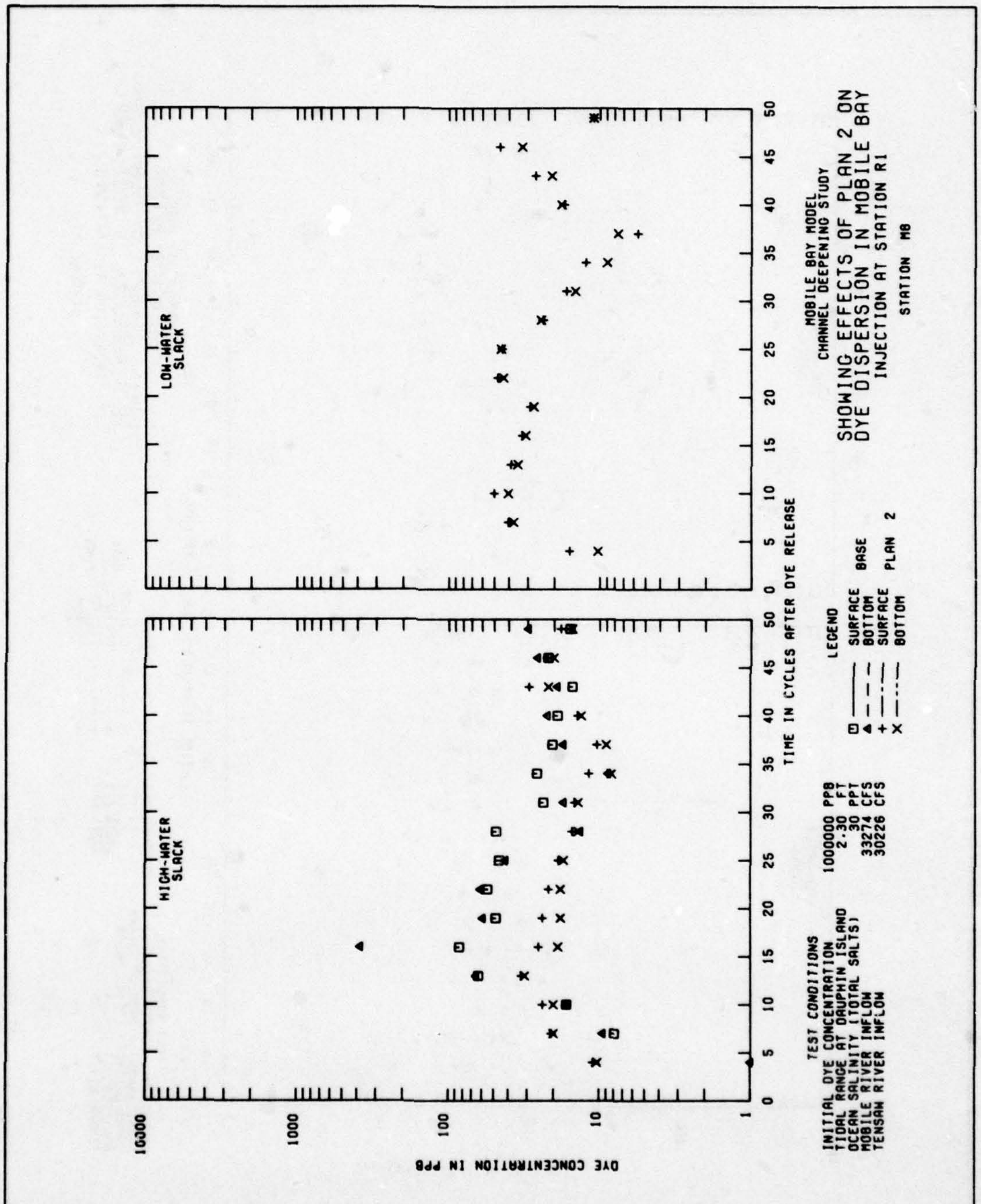
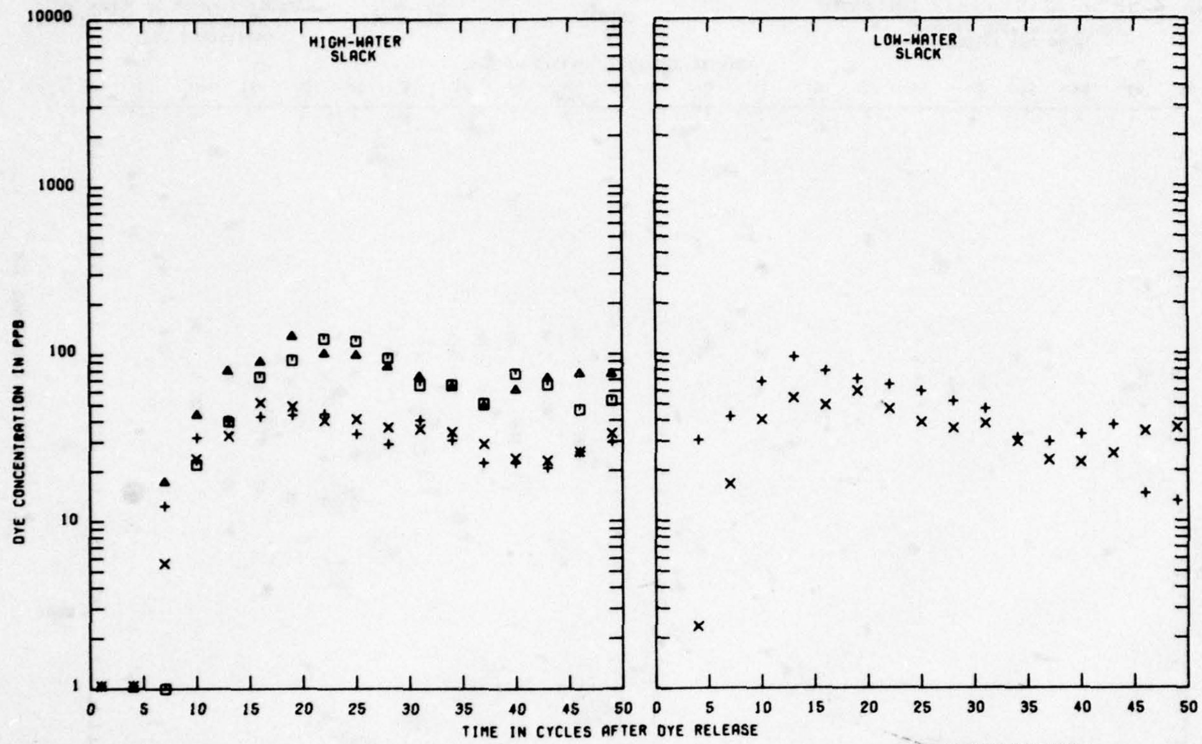

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION M8
HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2

PLATE A20




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

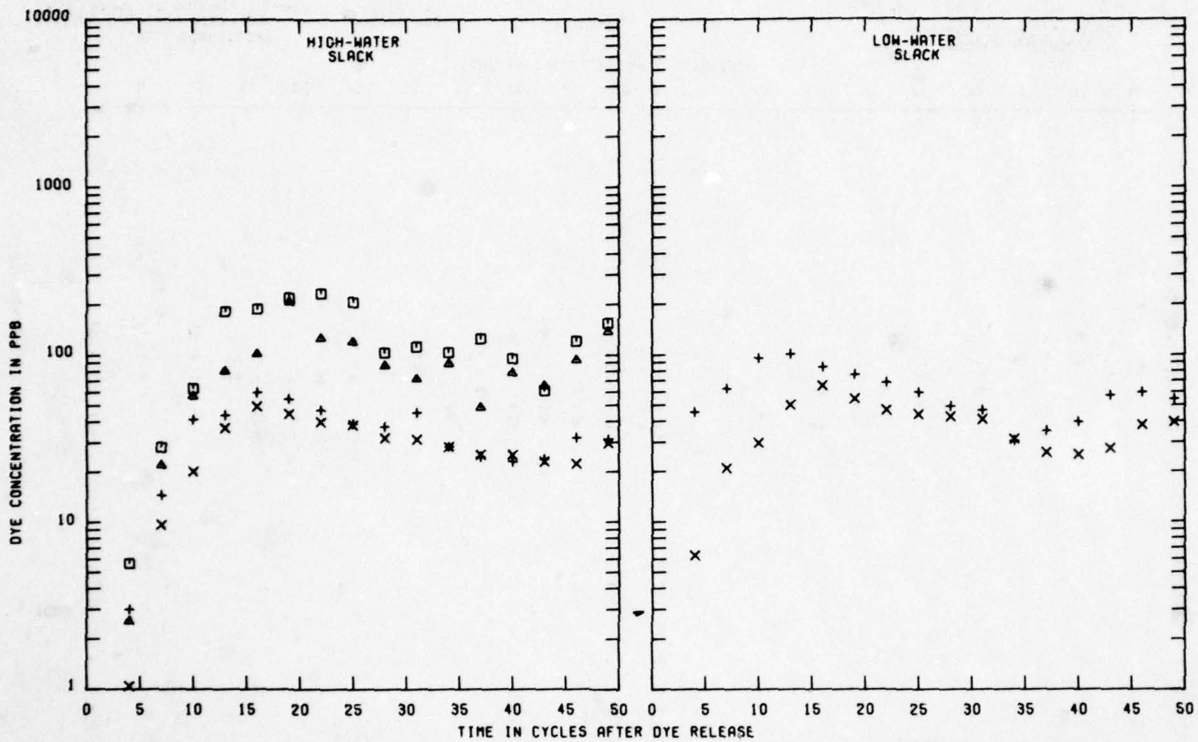
LEGEND

| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·— | SURFACE | PLAN 2 |
| × —··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M9




| TEST CONDITIONS | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

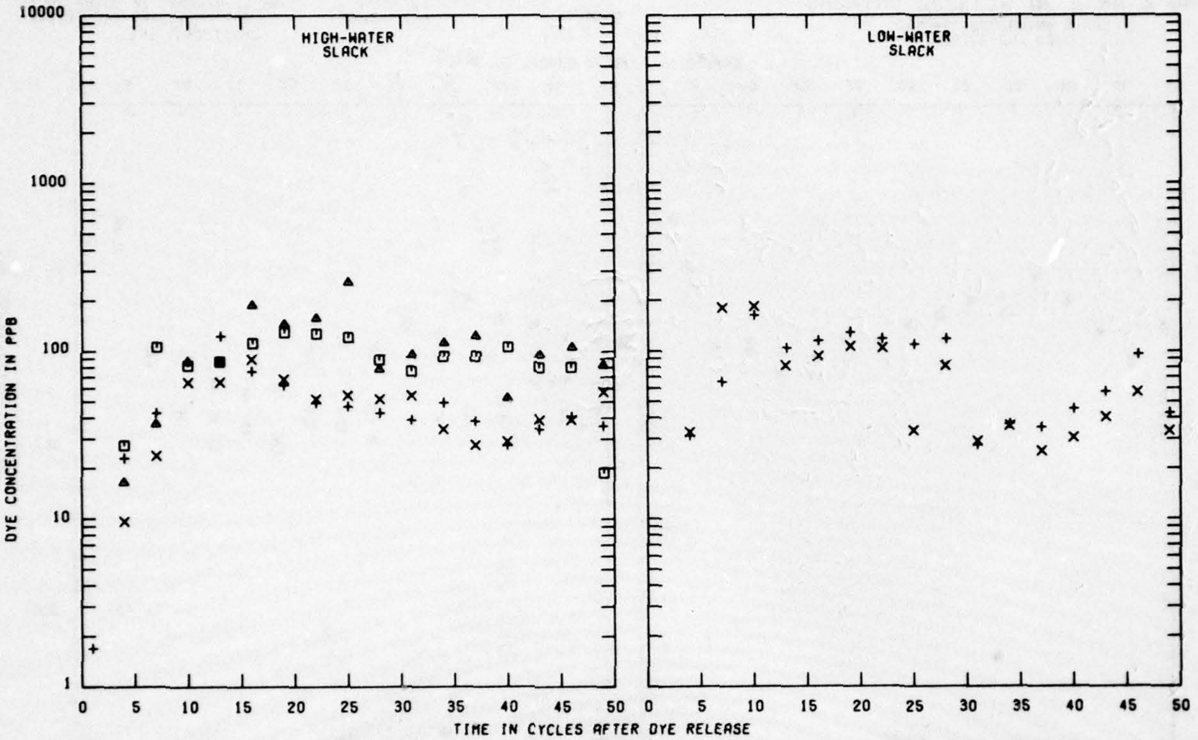
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·— | SURFACE | PLAN 2 |
| × —··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M10

PLATE A22




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

SURFACE, BOTTOM: BASE
SURFACE, BOTTOM: PLAN 2

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M11

**PLATE A23**

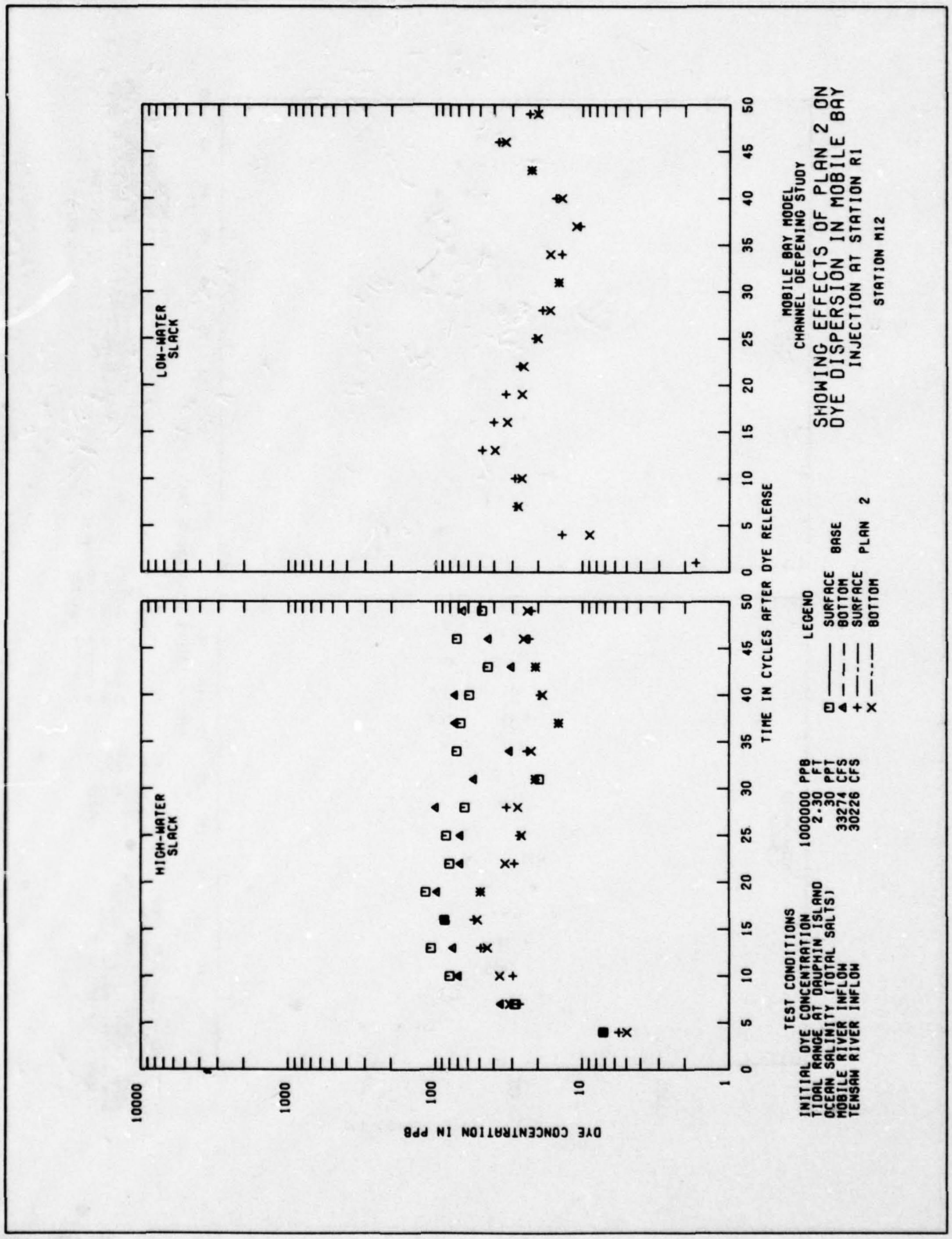
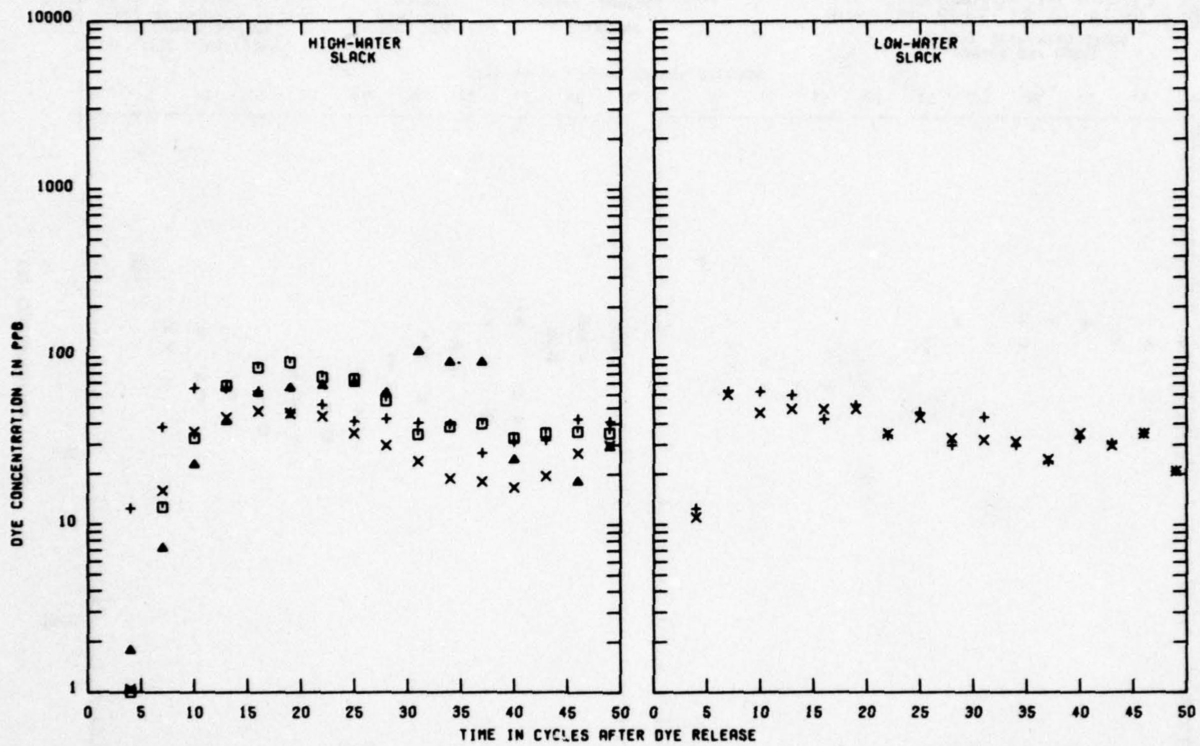

DYE CONCENTRATION IN PPB
10000
1000
100
10
1
0 5 10 15 20 25 30 35 40 45 50
TIME IN CYCLES AFTER DYE RELEASE
HIGH-WATER SLACK
LOW-WATER SLACK
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION M12

PLATE A24




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

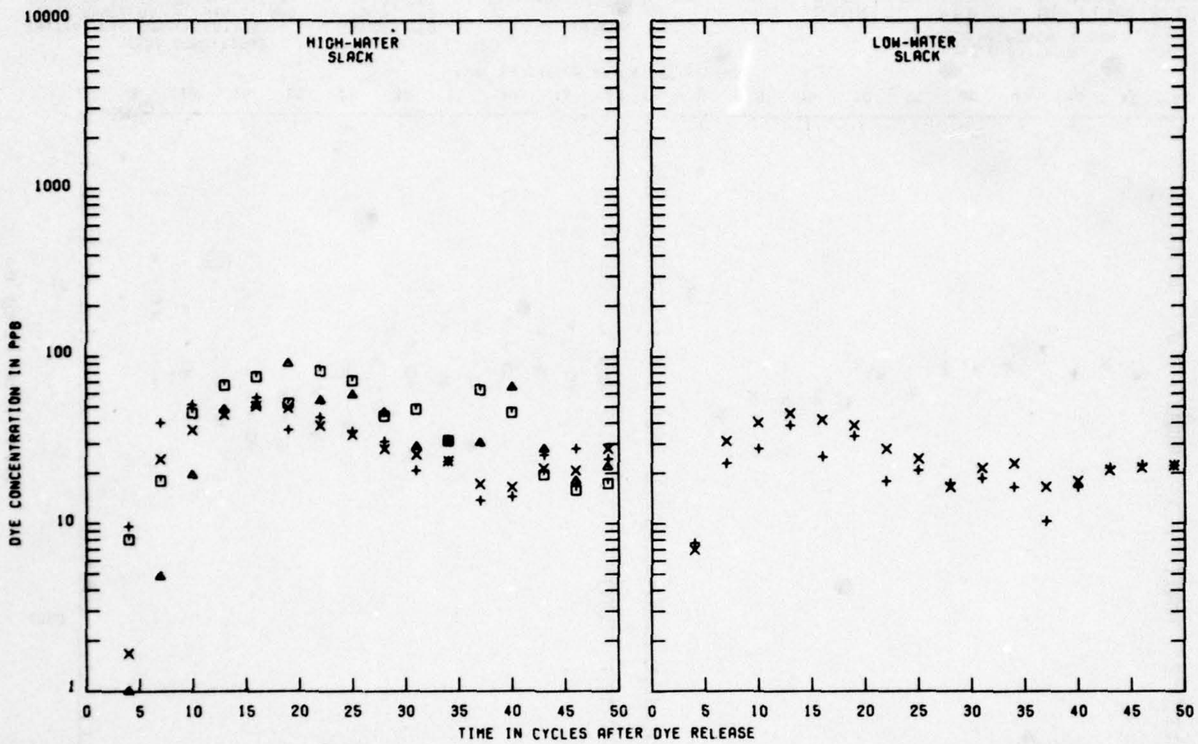
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·— | SURFACE | PLAN 2 |
| × —··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M13

PLATE A25




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

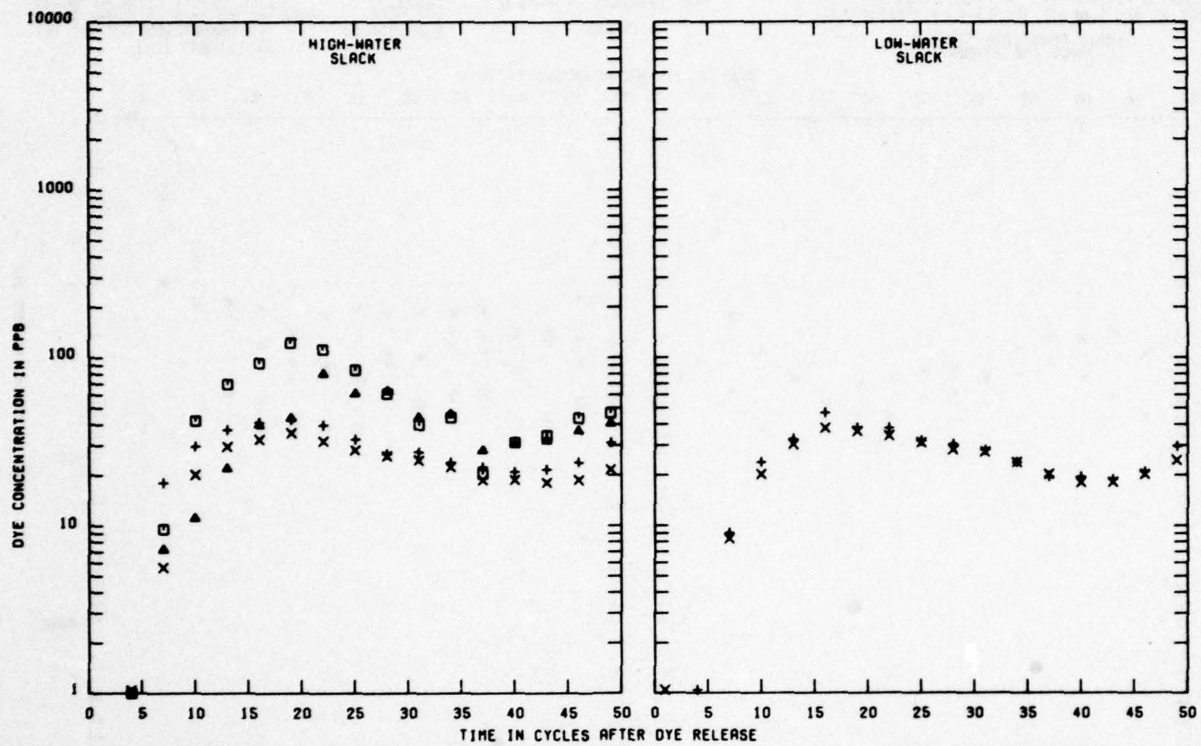
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·— | SURFACE | PLAN 2 |
| × —··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M14

PLATE A26




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

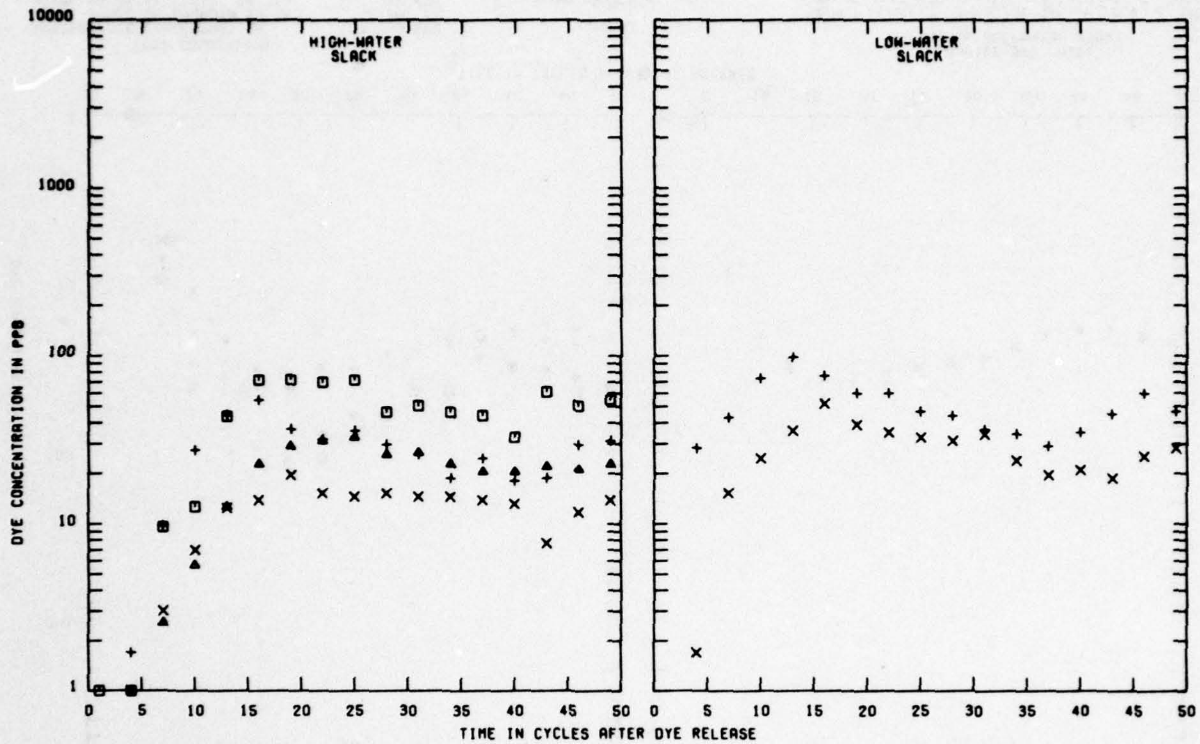
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·— | SURFACE | PLAN 2 |
| × —··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M15

PLATE A27




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

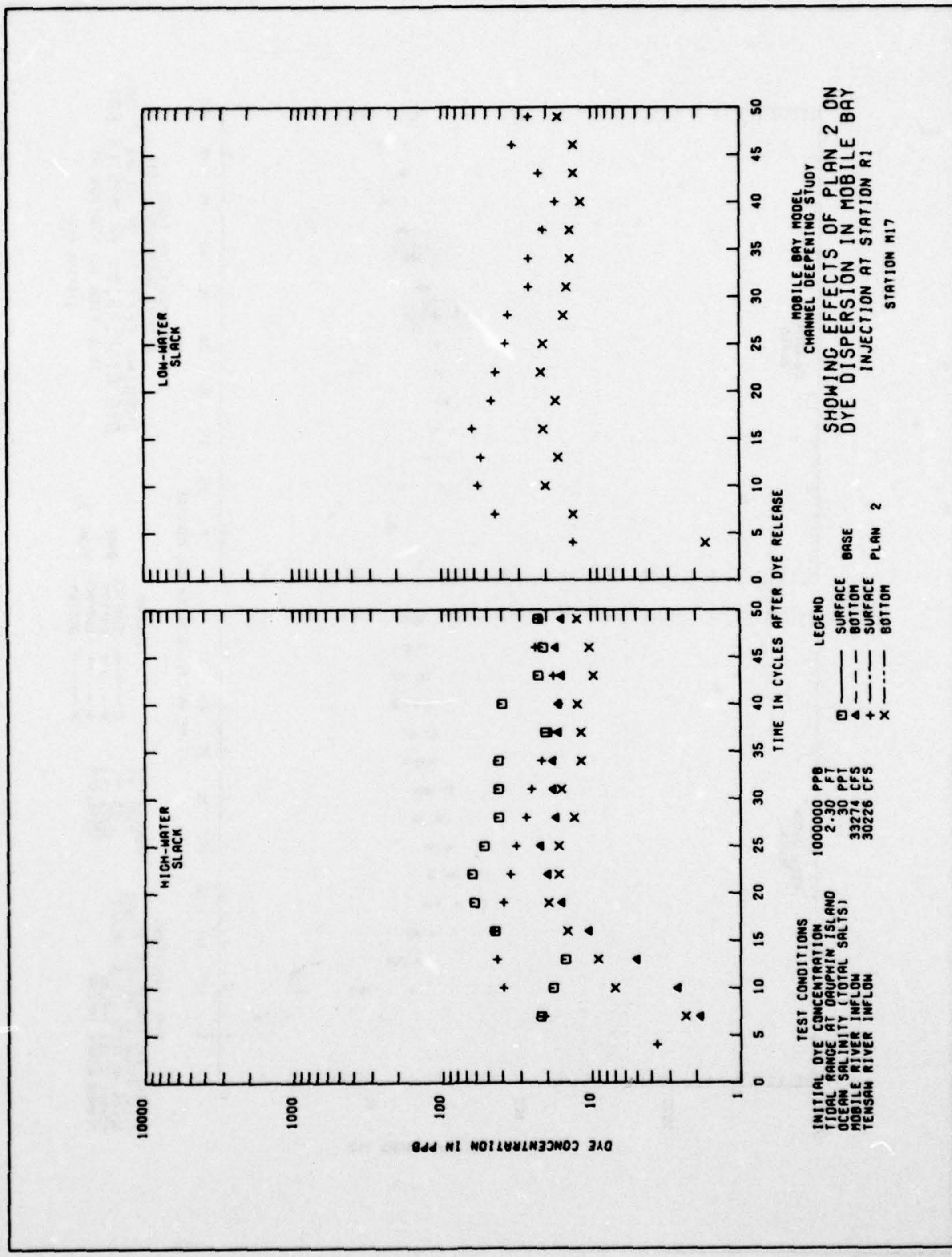
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·— | SURFACE | PLAN 2 |
| × —··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M16

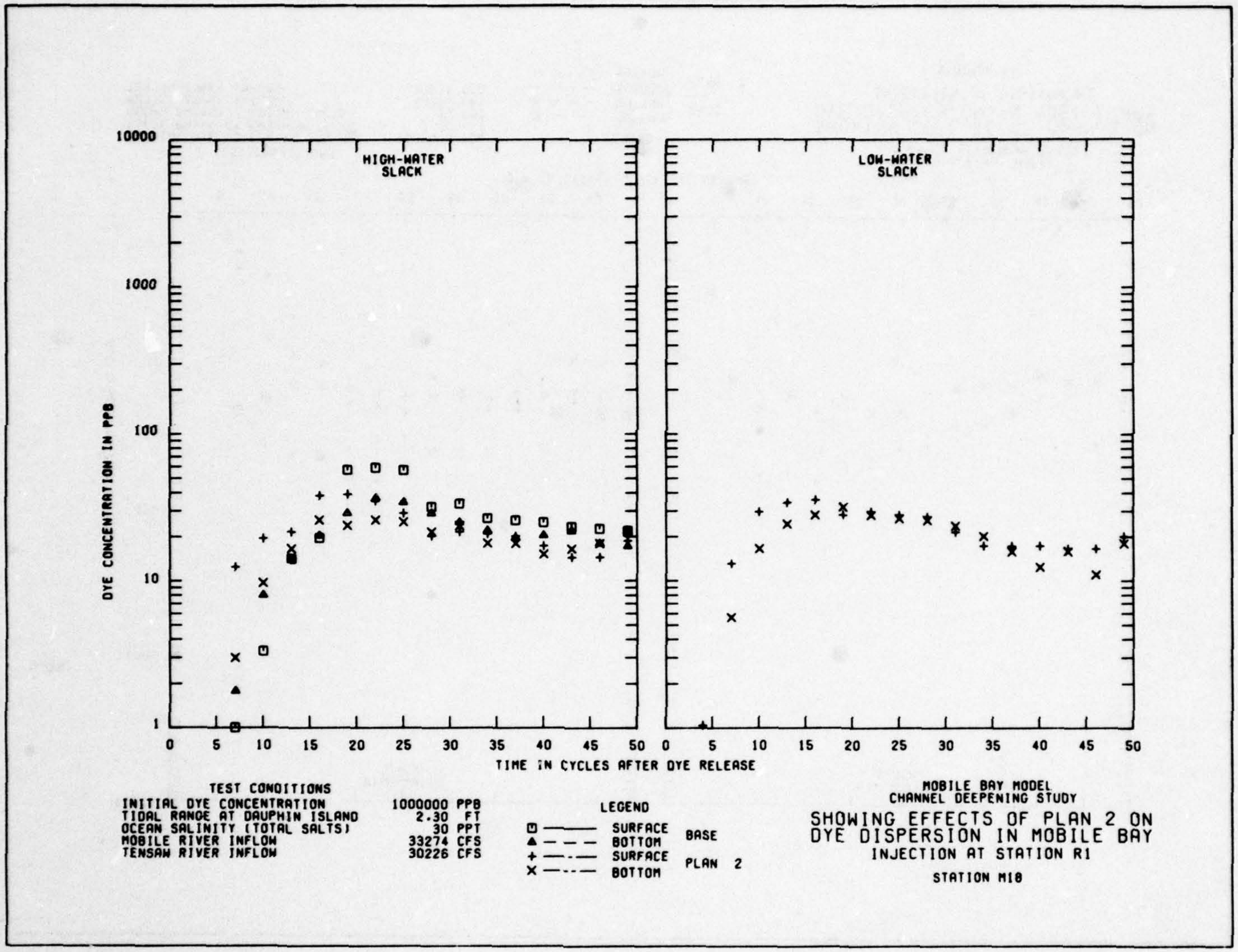
PLATE A28

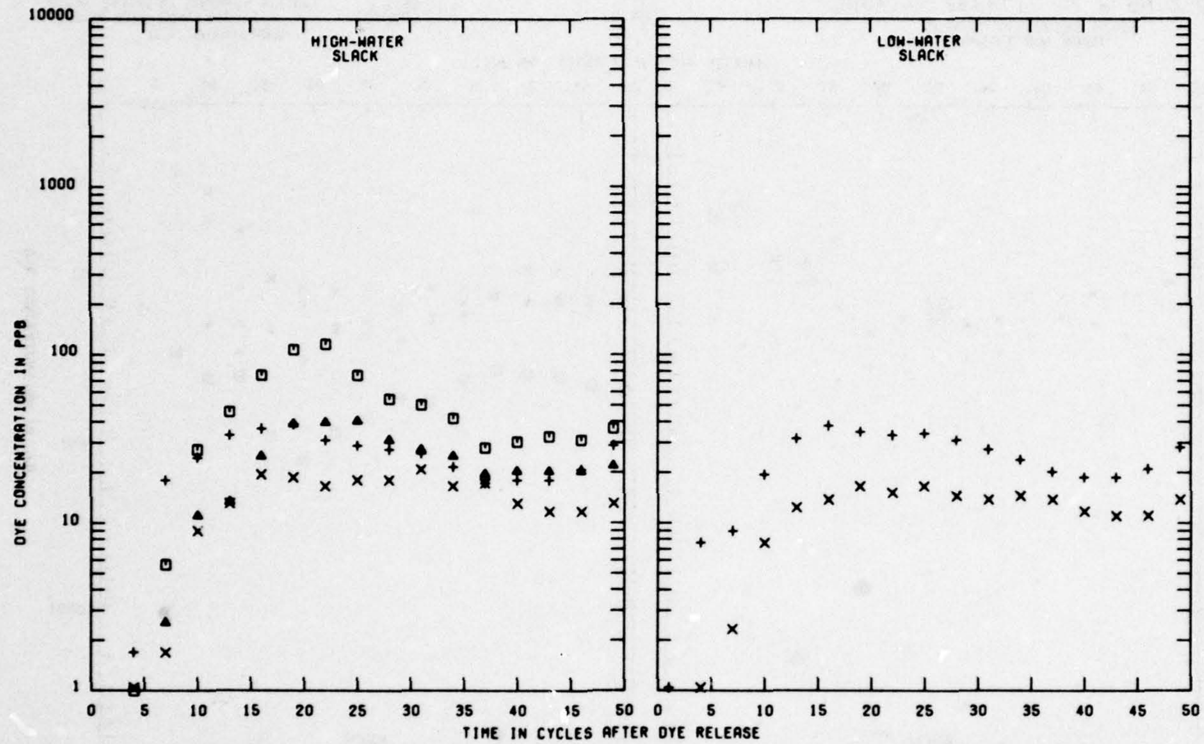


MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION M17
HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2


PLATE A29

PLATE A30


HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
10000
1000
100
10
1
0 5 10 15 20 25 30 35 40 45 50
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION M18




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

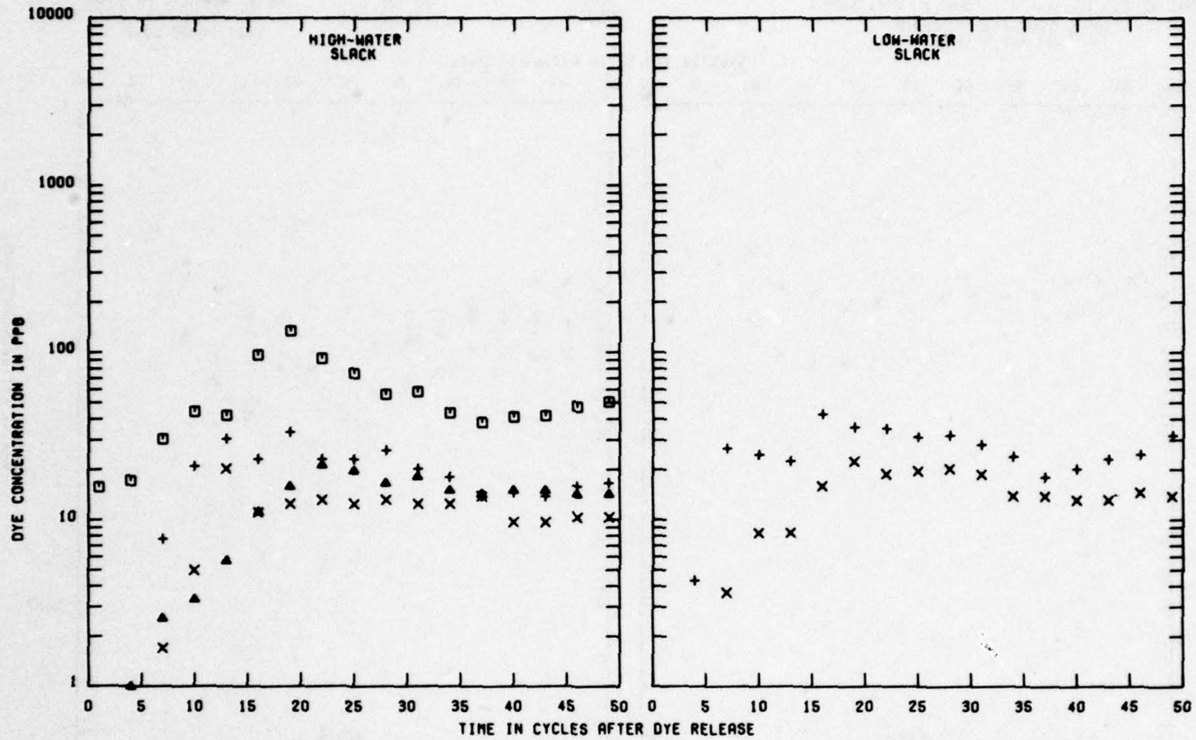
LEGEND

| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M19




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

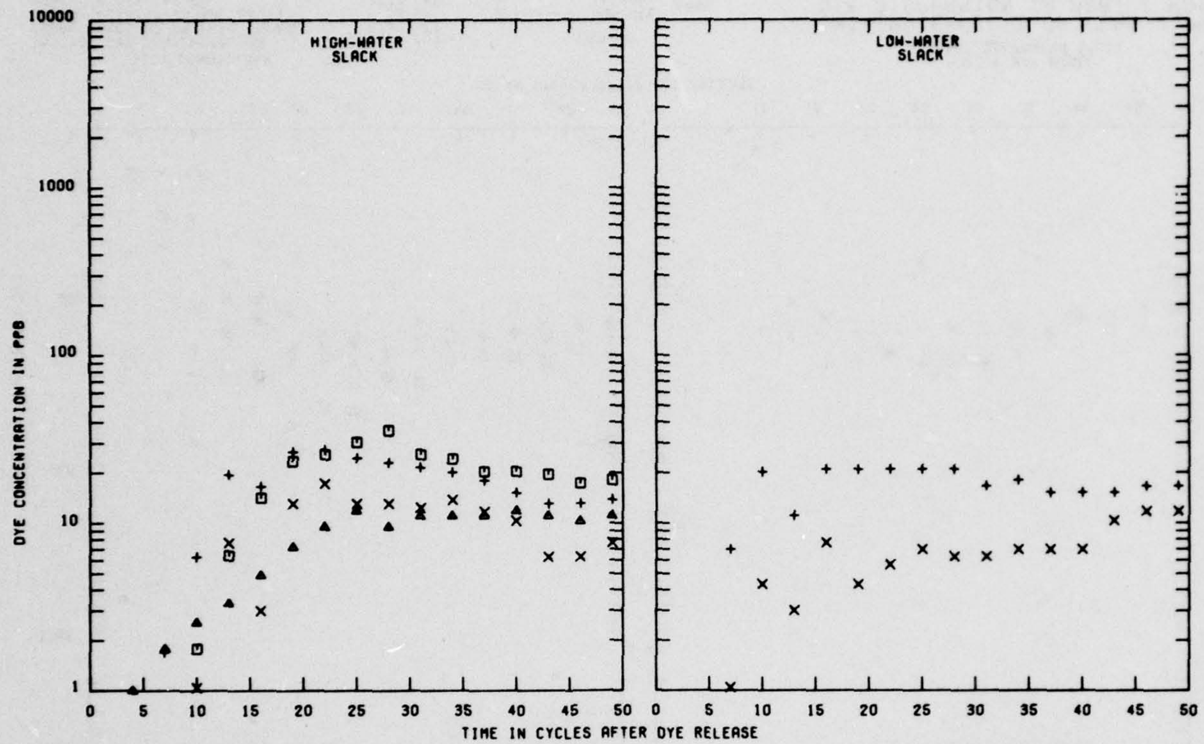
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·— | SURFACE | PLAN 2 |
| × —··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M20

PLATE A32




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

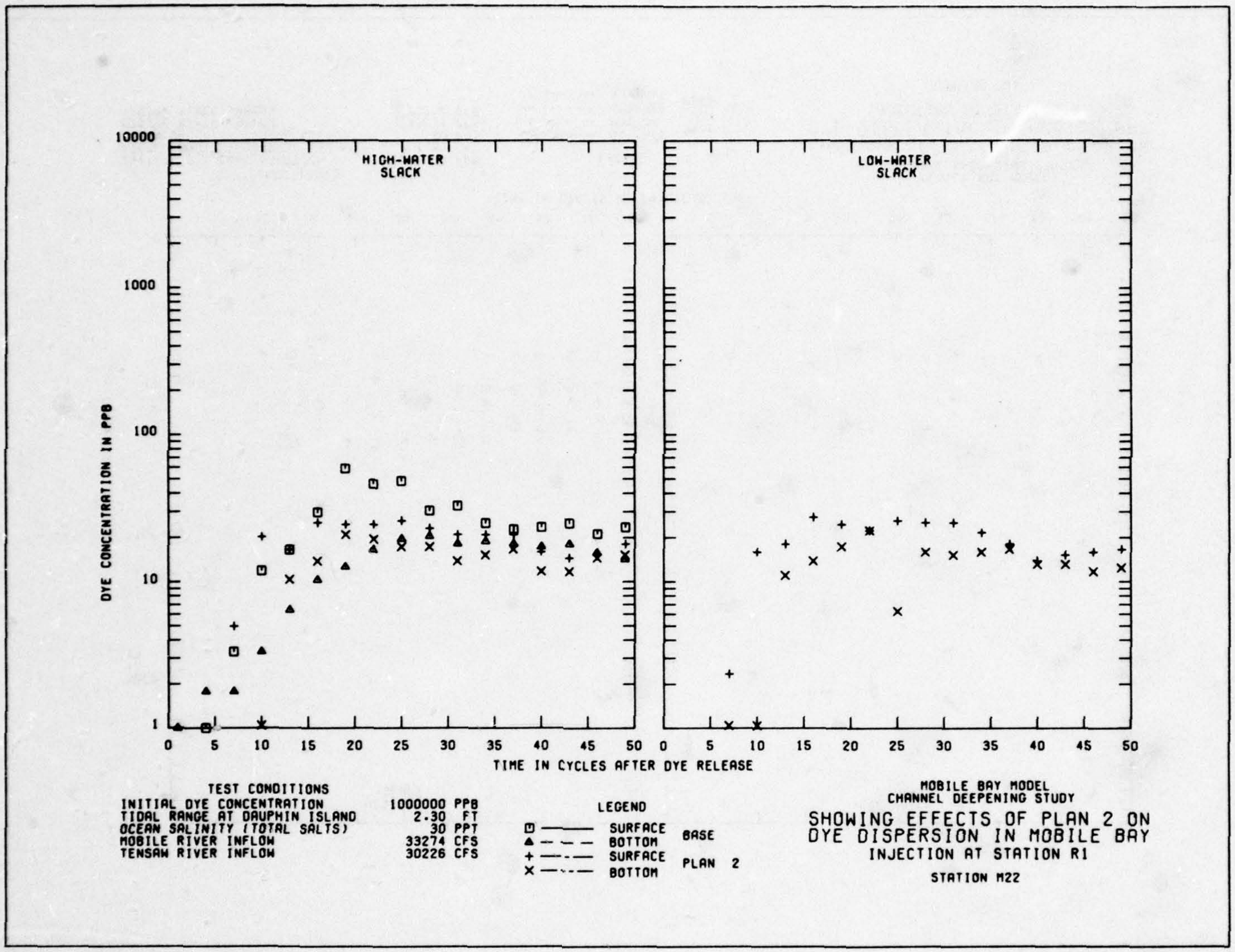
LEGEND

| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

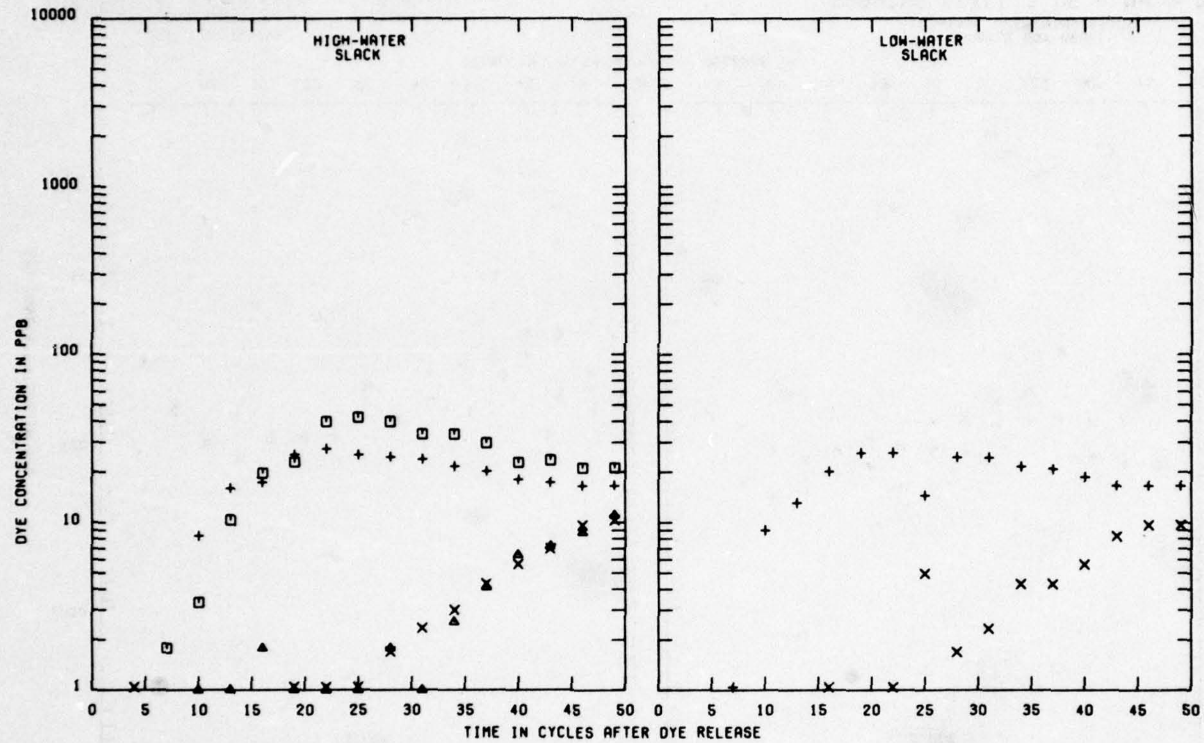
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M21



HIGH-WATER SLACK
LOW-WATER SLACK
DYE CONCENTRATION IN PPB
10000
1000
100
10
1
0 5 10 15 20 25 30 35 40 45 50
TIME IN CYCLES AFTER DYE RELEASE
TEST CONDITIONS
INITIAL DYE CONCENTRATION 1000000 PPB
TIDAL RANGE AT DAUPHIN ISLAND 2.30 FT
OCEAN SALINITY (TOTAL SALTS) 30 PPT
MOBILE RIVER INFLOW 33274 CFS
TENSAW RIVER INFLOW 30226 CFS
LEGEND
SURFACE
BOTTOM
BASE
SURFACE
BOTTOM
PLAN 2
MOBILE BAY MODEL
CHANNEL DEEPENING STUDY
SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1
STATION M22


PLATE A34




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

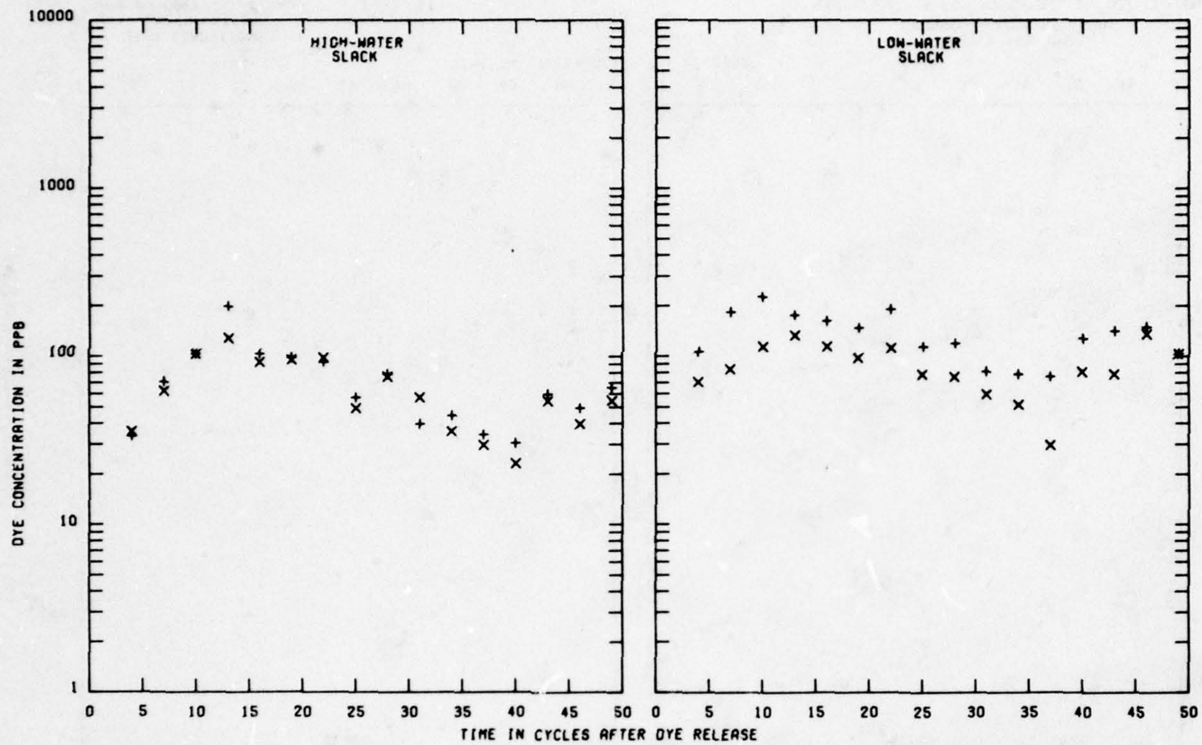
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M23

PLATE A35




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

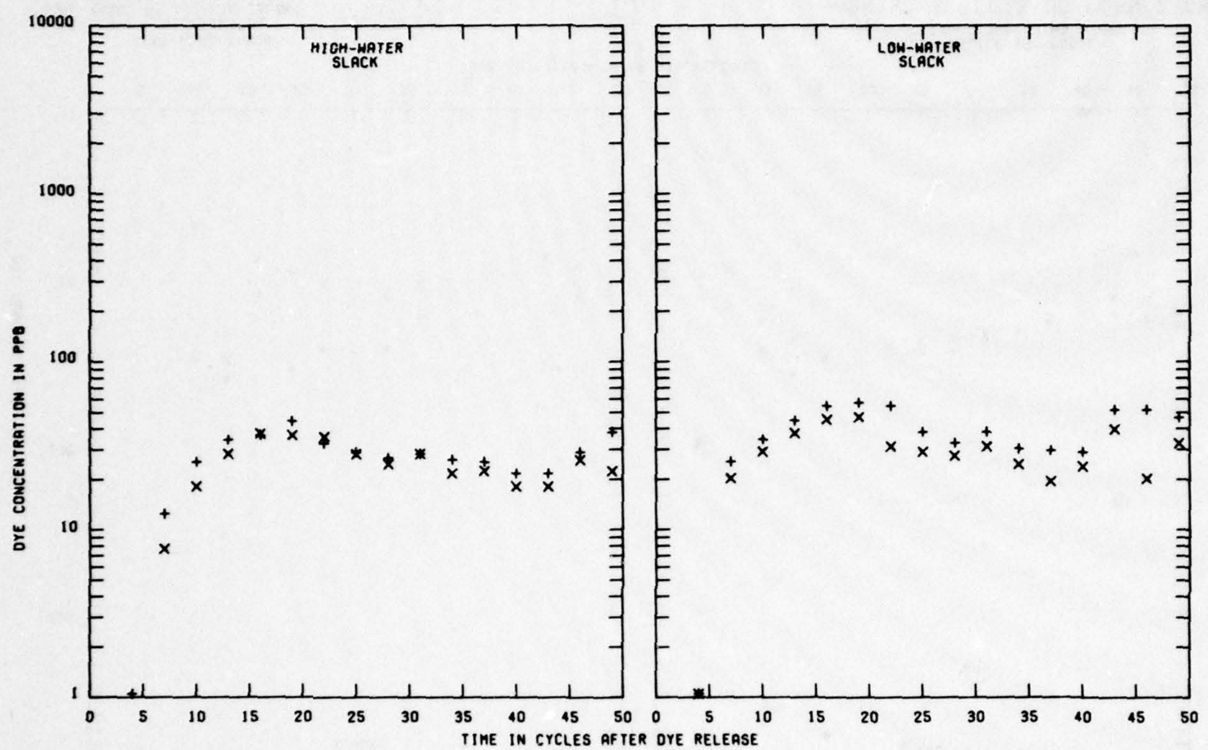
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—·· | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M24

PLATE A36




TEST CONDITIONS

| | | |
|---|---|---|
| INITIAL DYE CONCENTRATION | 1000000 | PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 | FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 | PPT |
| MOBILE RIVER INFLOW | 33274 | CFS |
| TENSAW RIVER INFLOW | 30226 | CFS |

LEGEND

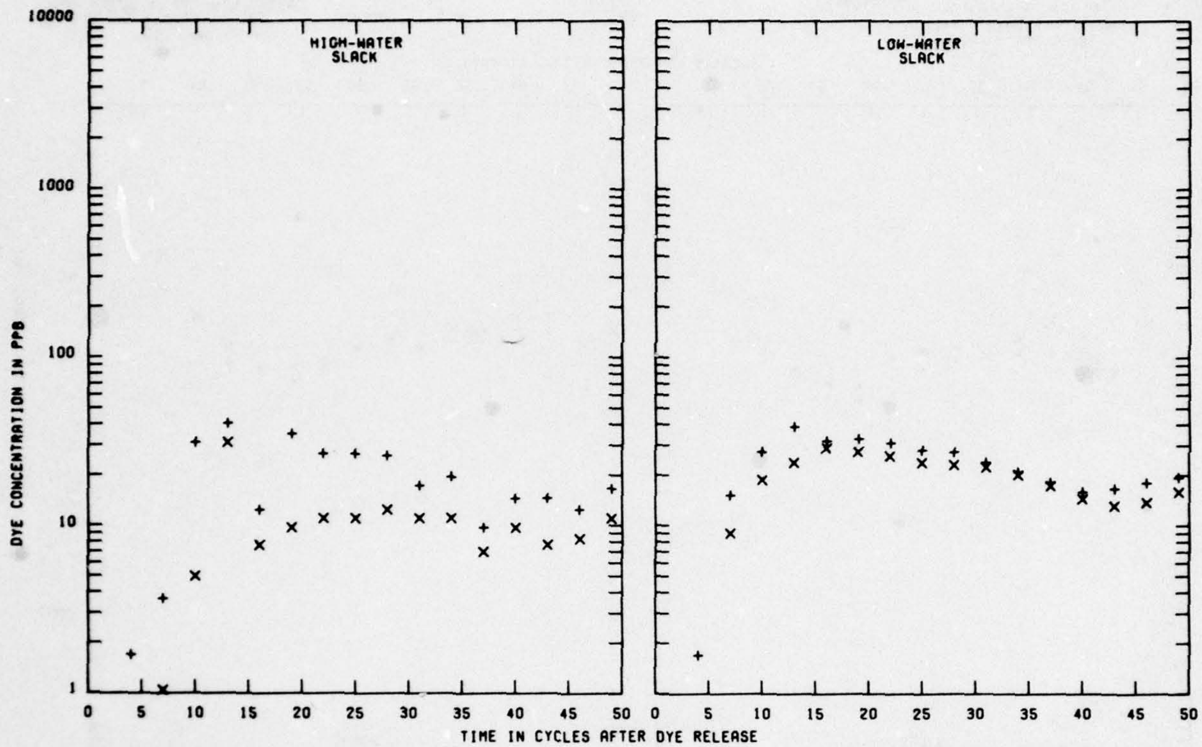
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—·· | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M25

PLATE A37




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

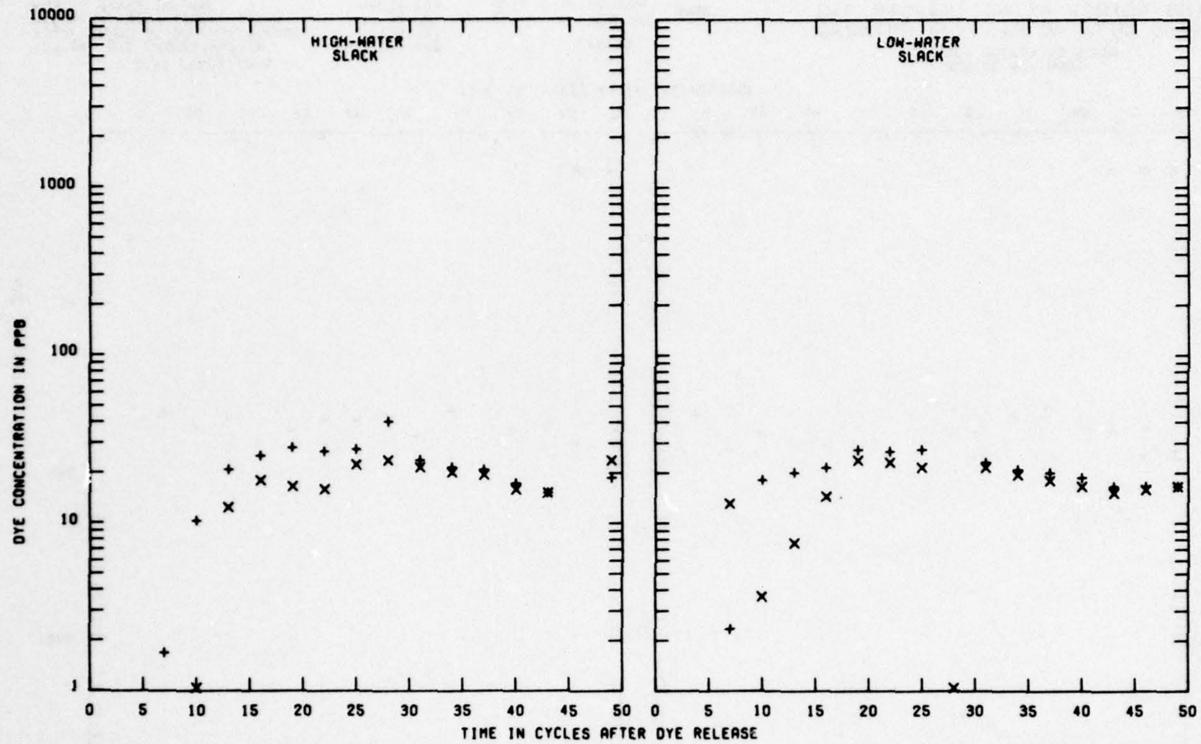
| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·— | SURFACE | PLAN 2 |
| × —··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M26

PLATE A38




TEST CONDITIONS

| | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

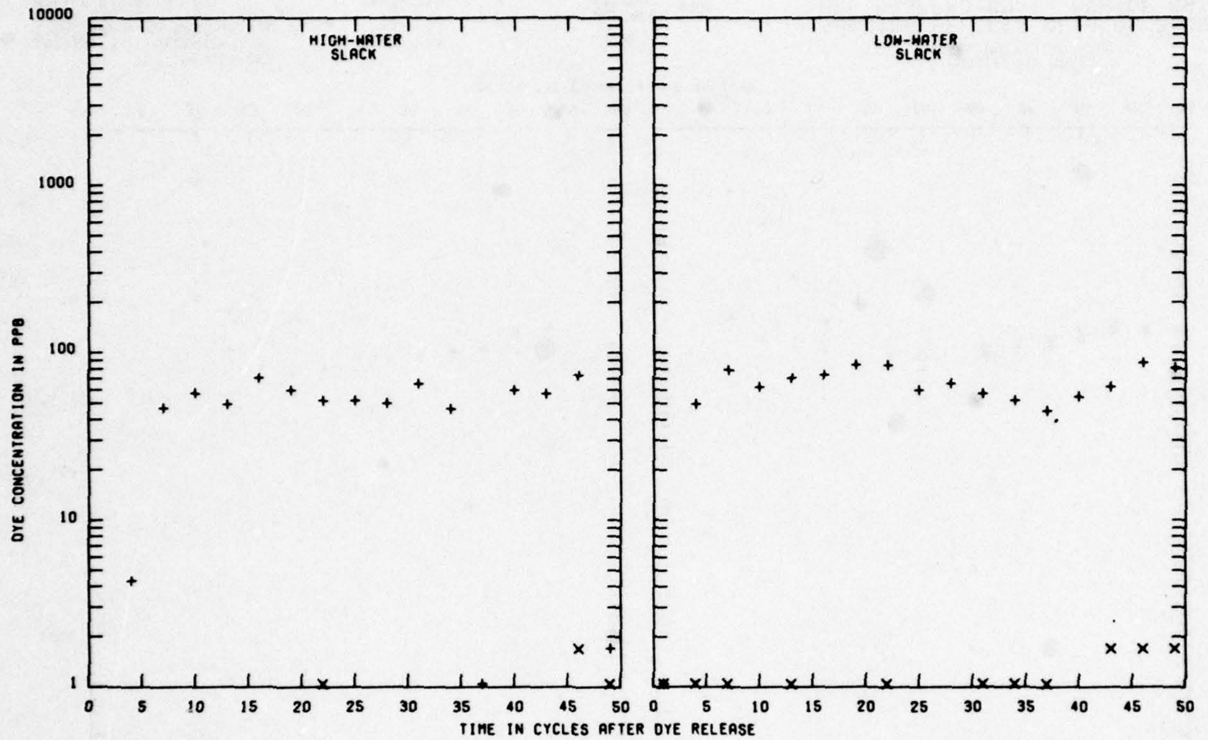
LEGEND

| | | |
|---|---|---|
| ⊡ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·—·— | SURFACE | PLAN 2 |
| × —··—··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION M27




| TEST CONDITIONS | |
|---|---|
| INITIAL DYE CONCENTRATION | 1000000 PPB |
| TIDAL RANGE AT DAUPHIN ISLAND | 2.30 FT |
| OCEAN SALINITY (TOTAL SALTS) | 30 PPT |
| MOBILE RIVER INFLOW | 33274 CFS |
| TENSAW RIVER INFLOW | 30226 CFS |

LEGEND

| | | |
|---|---|---|
| □ ——— | SURFACE | BASE |
| ▲ — — — | BOTTOM | |
| + —·— | SURFACE | PLAN 2 |
| × —··— | BOTTOM | |

MOBILE BAY MODEL
CHANNEL DEEPENING STUDY

SHOWING EFFECTS OF PLAN 2 ON
DYE DISPERSION IN MOBILE BAY
INJECTION AT STATION R1

STATION TSC

PLATE A40

In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.


Berger, Rutherford C

Mobile Bay model study; Report 2: Effects of enlarged navigation channel on tides, currents, salinities, and dye dispersion, Mobile Bay, Alabama; hydraulic model investigation / by Rutherford C. Berger, Jr., Robert A. Boland, Jr. Vicksburg, Miss. : U. S. Waterways Experiment Station ; Springfield, Va. : available from National Technical Information Service, 1979.

52, [64] p., [130] leaves of plates : ill. ; 27 cm. (Technical report - U. S. Army Engineer Waterways Experiment Station ; H-75-13, Report 2)

Prepared for U. S. Army Engineer District, Mobile, Mobile, Alabama.

1. Dye dispersion. 2. Fixed-bed models. 3. Hydraulic models. 4. Mobile Bay. 5. Navigation channels. 6. Salinity. 7. Tides. I. Boland, Robert A., joint author. II. United States. Army. Corps of Engineers. Mobile District. III. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Technical report ; H-75-13, Report 2.

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